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SEABIRD HARVEST IN THE ARCTIC

CAFFs CIRCUMPOLAR SEABIRD GROUP

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Seabird Harvest in the Arctic

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Introduction

Flemming Merkel, National Environmental Research Institute of Denmark/ Greenland Institute of Natural Resources

Seabirds are often sensitive to reductions in adult survival rates since they produce small clutch sizes and have delayed maturity (Furness and Monaghan 1987). Therefore, knowledge of key potential mortality from natural or anthropogenic sources are among the essentials needed to manage and conserve such wildlife populations successfully (Newton 1998). At high latitudes, natural sources of mortality can be a major component in population dynamics; periodically inflicted by extreme weather conditions (Robertson and Gilchrist 1998) or generally challenged by low temperatures and reduced day length (Systad *et al.* 2000).

Seabird mortality imposed by human use occurs throughout the circumpolar nations and often date back hundreds or even thousands of years. Historically, birds were taken for their meat, eggs, skins and down. Until the 20th century communities were small and hunting was done primarily from non-motorized watercraft and probably had limited widespread impact on seabird populations (Denlinger and Wohl 2001). Since then, human population growth, mechanized transport, and the use of guns as hunting tools have increased the harvest of certain species of seabirds. This increase in hunting pressure has occurred simultaneously with increases in human disturbance at some seabird colonies related to offshore oil and gas development, commercial fisheries, tourism, and research (Denlinger and Wohl 2001). In addition, access to arctic regions may become easier and less costly in the future if sea ice continues to diminish as a consequence of climate change in the arctic. This will probably increase the attractiveness of the region for further oil and gas development and may apply additional stressors to the arctic environment (Huntington 2007).

Whether seabird harvest is a real conservation concern is often not addressed or poorly documented in the circumpolar region due to a lack of information on the status of seabird populations and the numbers of birds and eggs harvested. However, in this report several countries clearly leave the impression that harvest has played a key role at some point in population development for some seabird species. There are

F. Merkel: *Dovekies in Qaanaaq*, Greenland.

both examples of known or believed overharvesting causing substantial decreases in breeding populations and the opposite, i.e., rapid population recovery following major changes in harvest regulation.

Seabirds are internationally shared resources in the circumpolar region. Birds being harvested in one country may be from the breeding population of another country. For example, a considerable part of the common eiders shot during winter in Southwest Greenland are of Canadian origin (Lyngs 2003; Mosbech *et al.* 2006). The thick-billed murre is another example. Wintering birds shot in Southwest Greenland are a mixture of birds breeding in Canada, Greenland, Iceland, Norway and Russia (Lyngs 2003; Boertmann *et al.* 2004). Thus, cooperation in research, monitoring and harvest regulation between the eight countries participating in the Conservation of Arctic Flora and Fauna (CAFF) program is of the utmost importance in order to ensure sustainable harvests of the shared populations.

This report is a product of the Circumpolar Seabird Group (CBird). The seabird group functions under the auspices of CAFF, which was initially established under the Arctic Environmental Protection Strategy (AEPS) in 1991 and is now part of the Arctic Council. The report is an updated and revised version of a previous harvest report produced by the CBird group under CAFF (Denlinger and Wohl 2001) and summarizes information on seabird harvest activities, harvest regulations, and management approaches of the arctic countries. It reports the status of the management recommendations that was put forward by each country in the previous report and new management recommendations are made.

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F. Merkel: *A "wheel" of dovekies in Qaanaaq*, Greenland.

Executive Summary

Alaska (United States)

There are 92 species of migratory birds open to subsistence harvest by rural residents in designated regions in Alaska. Of these 92 species 37 species of seabirds, loons, and grebes are open for harvesting and egging. The total estimated annual harvest of these 37 species was 21,000 birds and 98,000 eggs during the 1995-2000 period. During the 2001-2005 survey period the annual estimates of bird and egg harvests increased to 30,000 and 145,000, respectively. Auklets and murres have been the most harvested seabirds while murres and gulls have seen the highest egg harvest. Historically, the Bering Sea/Norton Sound region has had the highest bird and egg harvests. The Alaska Migratory Bird Co-Management Council was created in 2000 to develop recommendations for migratory bird subsistence harvest regulations.

Canada

There is a long-tradition of harvesting seabirds in Canada, both by indigenous peoples and by European settlers who brought the practice of harvesting seabirds with them. Previously these harvests were for basic subsistence, but increasingly they are undertaken for cultural or sporting reasons. Most seabirds in Canada are protected from harvest by non-aboriginal harvesters, while aboriginal harvests are permitted. Of the non-aboriginal harvest, the majority of seabirds taken in Canada are common eiders and murres.

Common eiders are considered game birds, and their harvest is regulated in the same way as the continental harvest of waterfowl. They are hunted extensively from the eastern Canadian Arctic, along the Atlantic coast, south to New England. Murres, legally a non-game bird, are taken in a special harvest allowed in Newfoundland and Labrador, that was negotiated as a terms of union with Canada in 1949.

Aboriginal harvests of seabirds in Canada are generally not large, and involve mostly hunting of eiders near select communities. Egging of eiders, murres, black guillemots, gulls and terns also occurs near northern communities. Harvests of all seabirds in Canada are probably at sustainable levels, although specific issues surround some populations or harvesting zones. International cooperation with Greenland

D. Boertmann: *Murre colony studies in West Greenland* (Ritenbenk).

has led to improved harvest management and likely sustainable harvests of common eiders and murres in both countries. Efforts to improve harvest estimates of seabirds and to eliminate the illegal trade and sale of seabirds continue.

Faroes

Harvesting seabirds has a long tradition in the Faroes where seabirds are the only birds that can be hunted. The fowling has been relatively sustainable and as fowling is now, it does not affect any population seriously. Many people are still interested in fowling so it will probably continue for many years to come.

The harvest is regulated by a revised law from 1954. On land it is only the landowners that may hunt, while on the sea it is free for everyone having Danish civil rights. On land the traditional way of fowling is by using the fleygastong, a net between two thin arms on a long pole, and the method is used for puffins and fulmars. On the sea newly fledged fulmars are picked up from boats using a deep landing net. Shooting occur at sea in winter and the species hunted are shags, guillemots, razorbills and puffins.

It is allowed to harvest from a local seabird population that is estimated to about 1.5 mil. pairs. The annual harvest is highly fluctuating and is estimated to be from 65,000 to 240,000 birds, mainly fulmar fledglings and puffins. The fulmars are from the Faroes while 10% of the puffins are from Iceland. The murres and razorbills that are shut in winter are mainly from Iceland and Scotland. The hunting regulation is well known and accepted among the hunters. There is however, no hunting statistic, so a reliable hunting statistic and better population estimates would give a better possibility to regulate the hunting in a sustainable way.

Finland

Hunting is among the most popular hobbies in Finland. The share of hunters among the total population is larger than anywhere else in Europe. Shooting rights are bound to landownership. An exception is made by state-owned archipelago areas, where every licensed hunter can bag waterfowl. Only seaducks are hunted in Finland; there is no tradition in hunting genuine seabirds. There is no subsistence hunting, and the commercial value of seaduck bagging comprise less than 3% of the total value of all wildfowling. Yet, the socio-economical and cultural significance of seaduck hunting is considered large, especially in the Åland Islands. When entering the European Union (in 1996) Finland was harmonizing its hunting policies with the ecosystem-based EU Directives, and this set end to the long tradition of harvesting drakes in spring. This has been the most dramatic change in the Finnish seaduck hunting during the post-war era. Of the current management recommendations conducting studies on the role of hunting mortality as the population regulating factor in seaducks is of utmost importance.

Greenland

There is a long tradition for harvesting seabird in Greenland as a necessary food supply or for their down or skins. Today seabirds are still important for subsistence and recreational hunting, but harvest levels are declining.

A total of 19 seabird species can be harvested in Greenland. The harvest is regulated by open and closed seasons and daily quotas apply for some species. In general, the birds are now protected in the spring and during the breeding season, usually from the beginning of March or May until the end of August or mid October. For five species less restrictive rules apply to remote communities in North and East Greenland. Egg collection is allowed for dovekies, northern fulmars, glaucous gull and great black-backed gull, but are limited to certain areas or periods. The present regulations were implemented in 2002-2004. Previously, the open season was one to three moths longer for most species.

The majority of the seabirds harvested in Greenland are shot during winter in Southwest Greenland. The coastal and offshore waters of Southwest Greenland are internationally important winter quarters for seabirds breeding in Canada, Greenland, Iceland, Norway, Svalbard and Russia. It is crudely estimated that a minimum of 3.5 million seabirds use this region in winter. The most numerous species are common eider, king eider, thick-billed murre and dovekie. The majority of seabirds taken in Greenland are thick-billed murres and eiders, with app. 90,000 and 25,000 birds (king- and common eider combined) shot per year since 2002, respectively. Before 2002 harvest levels were two or three times as high. Dovekies and black-legged kittiwakes also constitute important harvest sources in Greenland, with app. 25,000 and 10,000 birds reported yearly since 2002. In contrast to other harvested species the dovekies are mainly harvested during the breeding season in Northwest Greenland.

Harvest statistics are compiled through a nationwide bag recording system (Piniarneq), which was introduced in 1993. This program collects information of monthly bag numbers by means of hunters report. There is a distinction between recreational hunters and commercial hunters. The latter are subsidized and makes at least half their income on hunting and fishing.

Given that Greenland waters constitute international important winter quarters for seabirds international cooperation is important for their management. For murres and eiders, conservation strategies and action plans developed under CAFF have been important as guidelines and promoters for seabird management in Greenland. Especially for common eiders joint efforts between Canada and Greenland have been successful and led to improved harvest management and probably sustainable harvests levels.

Iceland

Nowadays 22 seabird species breed in Iceland. For 19, harvesting is allowed, under guidance of the Act on conservation, protection and hunting of wild birds and land mammals (no. 64/1994), supervised by the Ministry for the Environment. No one agency regulates all aspects of hunting, but the Environment Agency (a management authority) and the Icelandic Institute of Natural History (a research institute) are advisory to the ministry on matters of bird conservation and hunting. No wildlife enforcement service is found in Iceland and the general police uphold the law on wild birds.

Anyone with a hunting licence can hunt if the respective landowner grants his permission. Maximum range for the hunting seasons is laid down in the wild bird and mammal act. The actual hunting seasons can be shortened but never lengthened. Basically only guns (up to 12 bore) and rifles can be used for hunting. Various inhumane methods, in line with the Bern Convention, are totally forbidden by law.

Iceland is estimated to have around 4500 seabird colonies, with a total breeding population of about 7.5 million pairs. Hundreds of seabird colonies are utilized in every part of

G. Gilchrist: ***Researchers on the edge.***

F. Merkel: *Installing photo monitoring equpment in a murre colony (Kippaku),* West Greenland.

the country, both for birds and eggs. Seabird huntingalso takes place outside the breeding season at many localities along the coast or from boats out at sea. Eiders hold a special place with Icelanders. The long tradition of down-collecting makes the eider economically the most important seabird species by far, with revenues totalling ca $4 million dollars per year.

Hunting statistics has been compiled in Iceland since 1995. Similar data were collected 1898-1939. The regulation on hunting statistics only relates to taking of birds but eggs and eider down are not included. The export of down is recorded in trade reports while domestic trade reports cover the internal market.

Everyone wishing to hunt has to register for a hunting licence. Landowners need a special licence to utilize traditional natural resources. On average 350 thousand seabirds are killed per year. No information is available on the number of eggs collected. The highest number of birds caught for any one species is puffin, varying from 150 to 233 thousand per year. The hunting data since 1995 are available on the web (http://www.ust.is/Veidistjornun/Almennt/Veiditolur/). About 3 tonnes of cleaned eider down is collected from nests annually.

Nowadays harvesting is mostly as hobby, or to supplement primary sources of income. The most notable exception is the “eider-farming”, which has a firm basis in the Icelandic farming community. There are domestic sales of fullgrown puffins, murres and razorbill (eggs and birds), kittiwake and other gull eggs, and to a lesser extent fulmar eggs, gannet, shag and cormorant young. Exports of wild birds are minimal and subject to export licence from conservation authorities.

No special outreach programmes are being carried out in Iceland on the harvest of seabirds. This group of birds, as are other game bird species, is dealt with as part of curricula for would-be hunters.

The impact of hunting varies depending on species. The highest percentage of the respective population is that for shag and cormorant and some large gulls (great black-backed, lesser black-backed, herring). For each species estimated 20-30% of the populations are killed each year. Of glaucous gull and black guillemot 15 and 10% are taken respectively. For most other species only a few percentage of the populations is taken, even for such heavily-hunted species like puffin (2-3%). Iceland shares large seabird resources with other countries and cooperation is needed for successful solutions to conservation problems.

Earlier Iceland has recommended two projects related to harvest; (1) research on population sizes and the effects of harvesting, both local and national, and (2) programs to assemble information on egg collecting, especially relating to black-legged kittiwakes, razorbills, and common murres. Neither of these projects have been fully executed but some advances have been made on the former. Five general recommendations were included in the CAFF harvest report of 2001 and some progress has been made on most. In the most recent years there have been global issues, which may have potential effects on seabirds and seabird harvest, i.e. avian influenza and climate change. In 2006 a Nordic project on harmonizing databases was completed and a colony database computer program was developed, available on the internet free of charge (ftp://ftp.npolar.no/Out/NordicDatabase/).

Norway

Harvesting of marine birds has a long tradition in Norway and used to be widespread and important. Today, the extent of harvesting is reduced and subject to strict regulations. In North Norway and Svalbard in total approximately 5,000 birds are shot annually (all species; estimate based on hunting statistics). Harvesting can not be said to be a significant threat

to marine birds in northern Norway and Svalbard because of the strict regulations and relatively low annual harvest

Russia

In spite of the wide-range distribution of the seabirds in the Russian Arctic, seabird harvest has never been of primary importance for local economies and communities. Most of the seabird colonies in the Western and Central Russian Arctic are located on the remote offshore islands originally not inhabited by northern natives. In Eastern Russian Arctic where seabirds nesting grounds are more accessible, seabird harvest is more important for local people. Indigenous people of the NE Russia have been harvesting seabirds since ancient time. Nowadays, seabirds and their eggs are harvested to a lesser degree. In former times, commercial harvesting of seabirds (mostly guillemots and their eggs) and eider down collection has depleted nesting colonies in several places in the Barents Sea Region. Since mid-XXth century this practice is banned, and many important colonies are protected.

Importance of different seabird species as a harvested object varies considerably along the vast territory of the Russian Arctic and primarily depends on the regional seabird availability. In Russia, the waterfowl is traditionally a major hunting target especially in the North, while colonial seabirds and their eggs have never been as important. Among the entire group of seabirds largely eiders are harvested in the Russian Arctic, to a less extent alcids and gulls, while other groups (divers, cormorants, skuas and terns) are of very limited use.

In Russia, seabirds except sea ducks, are not considered hunting objects for the general public while egging is prohibited. Hunting is allowed during open hunting seasons in spring and autumn. Spring waterfowl hunting allows killing of geese and drakes only. There is an exception in hunting regulation for the Indigenous Minorities of the North. They are allowed to harvest seabirds including cormorants, divers, alcids, gulls, skuas, and terns excluding species and populations red-listed both on federal and regional levels. Although waterfowl, including geese and ducks, is one of the major game bird resources in Russia, eiders have special status. Eiders are largely protected in the Russian Arctic but local hunting rules for them are regulated differently by regional normative acts, and in some areas in the Eastern Russian Arctic there is an open season for eiders.

There is no well established federal monitoring system for the hunting bags in Russia, while sustaining harvest by northern indigenous people is not assessed at all. The data available on harvest volumes is very scarce and fragmentary and obtained as a result of occasional advanced investigations.

David Irons: ***Auklet and horned puffin.***

Harvest of Seabirds in Alaska

Kenton Wohl, Cynthia Wentworth and Donna Dewhurst, *U.S. Fish and Wildlife Service, Anchorage, Alaska, USA*

1. Introduction

Marine and coastal ecosystems are biologically dominant features in Alaska. As such, Alaska supports North America's greatest concentration of seabirds. Populations of seabirds are greater and more diverse in Alaska than for any similar region in the entire Northern Hemisphere. Alaska occurs at the northern edge of the Pacific Ocean and is the terminus for many breeding seabird species and some trans-Pacific migrants that are seldom seen in the Northern Hemisphere outside of Alaska or the arctic (Kessel and Gibson 1978).

The extensive coastal estuaries and offshore waters of Alaska provide breeding, feeding and migrating habitats for 72 species of seabirds (USFWS 1992). At least 38 of these species breed in Alaska, and their breeding population is estimated to be about 50 million birds which is over 90 percent of the U.S. breeding population (USFWS 1999). The entire U.S. breeding populations of 22 species occur in Alaska, and eight species breed nowhere else in North America (USFWS 1992). Approximately 50 million additional seabirds of over 20 species migrate from breeding areas in the Southern Hemisphere to spend the northern summer (Austral winter) off the coast of Alaska (USFWS 1992). Alaska's 50 million breeding seabirds nest in about 1800 colonies that range in size from a few birds to over a million (Stephensen and Mendenhall 1998).

The U.S. Fish and Wildlife Service (Service) has trust responsibility for the conservation and protection of migratory birds (including seabirds) in the United States. Seabird management policies and programs in Alaska are primarily concerned with protecting seabirds on and off National Wildlife Refuges, documenting population status and trends, providing the public with opportunities to enjoy seabirds, and determining the subsistence harvest of migratory birds, including seabirds.

In Alaska, *subsistence* is defined in federal and state laws as "customary and traditional uses" of wild renewable resources for food, materials, sharing, barter, and customary trade. For the purposes of this report, seabirds are defined as: albatrosses, fulmars, storm-petrels, shearwaters, cormorants, gulls, terns, jaegers, kittiwakes, and auks (murres, puffins, murrelets, auklets, and guillemots).

The five species of loons and the two species of grebes occurring in Alaska have also been included in the harvest tables. Harvest data for the four species of eiders, other sea ducks, shorebirds and waterfowl in Alaska are not included in this report. For information on the subsistence harvest of eider species in Alaska, the reader is referred to Paige and Wolfe 1998, Wentworth 1998, and USFWS 1999.

There are 92 species of migratory birds open to harvest by rural residents in designated subsistence harvest regions in Alaska. Of the 72 species of seabirds occurring in Alaska, 30 species are open for

David Irons: *Seabird subsistence hunt.*

harvesting and egging. In addition, the five species of loons and two species of grebes are also open to harvest (See Table 1).

Subsistence harvest surveys in Alaska were initiated in the mid-1980s primarily to document the harvest of waterfowl; detailed information on the seabird harvest was absent prior to the early 1990s.

This report summarizes information on the subsistence harvest of seabirds, loons, and grebes and their eggs in rural Alaskan communities. It is based on harvest survey information collected primarily by the Service, Alaska Department of Fish & Game, and Native organizations under contract with the Service. This report is essentially an update of the Alaska chapter (Wohl and Denlinger 2001) in the Conservation of Arctic Flora and Fauna Technical Report No. 9 (Denlinger and Wohl 2001).

Table 1. List of seabirds, including loons and grebes, that are open for harvesting and egging in Alaska[1]

Northern fulmar	Common murre
Double-crested cormorant	Thick-billed murre
Pelagic cormorant	Black guillemot
Pomarine jaeger	Pigeon guillemot
Parasitic jaeger	Cassin's auklet
Long-tailed jaeger	Parakeet auklet
Bonaparte's gull	Least auklet
Mew gull	Whiskered auklet
Herring gull	Crested auklet
Slaty-backed gull	Rhinoceros auklet
Glaucous-winged gull	Horned puffin
Glaucous gull	Tufted puffin
Sabine's gull	Red-throated loon
Black-legged kittiwake	Arctic loon
Red-legged kittiwake	Pacific loon
Ivory gull	Common loon
Arctic tern	Yellow-billed loon (open only in the North Slope Region)
Aleutian tern	Red-necked grebe
	Horned grebe

2. Legal and regulatory framework for the subsistence harvest of seabirds in Alaska

In the early 1900s, the migratory bird harvest in North America was not federally regulated and commercial hunting of birds was reducing populations. To stem the declines in several bird species, the United States signed international treaties on migratory bird conservation with Great Britain (for Canada) in 1916, Mexico (1936), Japan (1974), and the U.S.S.R. (Russia) in 1976. These treaties prevent market hunting, open regulated sport harvest of "game" species (primarily waterfowl), and protect birds during the nesting season which occurs from March 10th to September 1st.

All four Conventions mentioned above are implemented in the United States primarily by the Migratory Bird Treaty Act of 1918, as amended, and the Fish and Wildlife Act of 1956, and designate the Department of the Interior (U.S. Fish and Wildlife Service) as the trust resource management agency for migratory birds, including setting harvest regulations.

The Conventions with Canada and Mexico closed the hunting of migratory birds in the spring and summer periods between March 10th and September 1st. However, neither of these two treaties recognized the subsistence lifestyles of northern peoples and the traditional harvesting of migratory birds and the spring and summer harvest continued despite the closed season.

In 1997, protocol amendments to the Canada and Mexico treaties were approved that legally recognized the customary and traditional use of migratory birds and their eggs in the spring and summer periods by indigenous people (later defined as Alaska Natives and permanent non-Native residents living in designated subsistence hunting areas). This official recognition of the subsistence harvest initiated a process for the effective regulation of the spring and summer harvest. Although a subsistence harvest was authorized in 1997, the first regulations were not published until 2003. Subsistence harvest regulations are developed annually along with an Environmental Assessment (USFWS 2007a, b).

1. A total of 92 species of ducks, geese, sea ducks, seabirds, shorebirds, and other water birds (loons and grebes) are open to harvest in Alaska. Source: USFWS 2007b. Managing migratory bird subsistence hunting in Alaska: regulations for the 2007 Alaska subsistence spring/summer migratory bird harvest. Migratory Bird Division. Anchorage, AK

The amendments allowed migratory birds and their eggs to be harvested by permanent residents of villages within designated subsistence harvest areas in Alaska. They also indicated that seasons and other regulations implementing the non-wasteful taking of migratory birds and the collection of their eggs would be consistent with customary and traditional uses. They essentially authorized the United States to establish regulated spring and summer harvests of birds, their eggs, and their down in Alaska. However, the preamble to the protocol amendment with Canada states that any significant increase in the take of species of migratory birds relative to their continental population sizes and compared to the take that is occurring at present would be inconsistent with the amended Convention. In North America, the harvest of migratory birds is now managed in accordance with this amended Convention.

The amendments also mandate that subsistence users will have an effective and meaningful role in the development and implementation of regulations through management bodies. These management bodies are to include Native, Federal, and State of Alaska representatives. In keeping with the 1997 amendment requirements, the Alaska Migratory Bird Co-management Council (AMBCC) was established.

The AMBCC's primary purpose is to make recommendations for subsistence harvest regulations that are submitted each year to the four North American Flyway Councils, and to the Fish & Wildlife Service Regulation Committee (AMBCC 2001) for approval and incorporation into the national migratory bird harvest regulations. Other purposes of the AMBCC are to: develop and conduct outreach communication; provide traditional environmental knowledge on regional or local levels; recommend law enforcement policies; promote and recommend habitat protection policies; and coordinate with other migratory bird groups and Joint Ventures regarding issues of common concern. The regional management bodies provide local input to the AMBCC in developing the bird open-to-harvest list, regional open season periods, methods and means of harvest and other annual regulatory recommendations. Once adopted, AMBCC recommended changes are then submitted to the Service Regulations Committee.

The AMBCC's organizational structure consists of equal representation of Federal, State, and Native organizations. Regional management bodies also provide representatives to the AMBCC. The regions that can provide representatives to the AMBCC are those 12 regions designated by the Alaska Native Claims Settlement Act of 1971; at this time 11, provide representatives. Partner organizations (i.e., regional management bodies) within each of the 12 regions are responsible for implementing the regulatory process within their regions (AMBCC 2001).

The AMBCC first met in 2000 to draft its by-laws and procedural guidelines and to begin the process of drafting recommendations for spring and summer subsistence harvest regulations. The first annual harvest regulations that opened a spring/summer subsistence migratory bird season, and that were implemented with AMBCC input, occurred in 2003. The development of harvest regulations continues annually. Additional information can be found at: http://alaska.fws.gov/ambcc/index.htm.

3. Seabird harvest survey methodology

As mentioned above, the Migratory Bird Treaty Act protocol amendments provide for the customary and traditional use of migratory birds and their eggs for spring and summer subsistence use. Rural residents in designated rural regions are eligible to participate in this harvest. The amendments state that the intent is not to cause a significant increase in the take of migratory birds. As such, the Fish & Wildlife Service, Alaska Department of Fish & Game, and Native organizations work cooperatively to collect harvest information in communities within the subsistence-eligible areas.

From 1989 to 2002, subsistence harvests in Alaska were monitored through household surveys in selected locales; e.g., Yukon Kuskokwim Delta in western Alaska. Although the first statewide coordinated subsistence harvest survey program was initiated in 2004, not all rural subsistence-eligible areas are surveyed annually.

Local village resident surveyors develop lists of all households in each village to be surveyed and provide standard survey forms to randomly selected households. Generally, the estimates of harvest per household are combined with the complete list of

households to arrive at a total estimated harvest per village.

4. Harvest of seabirds in Alaska

The estimated total annual harvest of seabirds in Alaska was over 21,000 and the egg harvest was about 98,000 (see Table 2) during the 1995-2000 survey period. Although there is not likely a large harvest of either birds or eggs from Southeast Alaska, the estimates for the 1995-2000 period should be considered the minimum numbers as that harvest region was not surveyed during that period. The seabird and seabird egg harvests represent about 9% and 85%, respectively, of the total estimated annual bird harvest in Alaska during the 1995-2000 period.

During the 2001-2005 survey period the annual estimates of seabird and egg harvests increased to about 30,000 and 145,000, respectively. Again, these should be considered minimum harvest numbers as all regions in Alaska and all communities within

Table 2. Estimated annual seabird and egg harvest in Alaska[1]

	Total rural communities	Community surveys	Estimated annual seabird harvest (1995 - 2000)	Estimated annual seabird egg harvest (1995 - 2000)	Estimated annual seabird harvest (2001 - 2005)	Estimated annual seabird egg harvest (2001 - 2005)
North Slope	8	1992-1993, 1995, 2005	0	0	43	3923
Northwest Arctic	11	1997-1998	143	12243	No New Data	No New Data
Bering Strait/ Norton Sound	16	1994-1996, 2002, 2004-2005	18480	39814	25750	92507
Interior	42	1998-2000, 2004-2005	0	0	0	0
Yukon/Kuskokwim Delta	38	1995-2005	817	3123	1085	6392
Bristol Bay	30	1995-2001, 2004-2005	282	28971	530	27180
Aleutian/Pribilof Island	11	1992, 1994, 1996, 2005	1839	8271	1342	15412
Kodiak	7	1999, 2003	74	3528	No new data	No new data
Cook Inlet	4	2000, 2004-2005	62	1041	1631	0
Gulf of Alaska	3	2000	3	1321	0	0
Copper River Basin	5	2000, 2004	0	0	0	0
Southeast Archipelago	4	None	No data	No data	0	0
Total	179		21700	98312	30381	145414

1 Eiders and other sea ducks are not included: loons and grebes are included as seabirds. Wentworth & Wong 2001; Paige *et al.* 1996; ADF&G and Kawerak, Inc. 1997; Wong and Wentworth 2001; Georgette 2000;Wong *et al.* 2000; Brower and Opie 1996, 1997; Brower 2000; Hepa *et al.* 1997; ADF&G 2001; Stovall 2000; Wentworth 2007

the surveyed regions were not surveyed. Although the estimated number of harvested birds and eggs increased over 30% during the 2001-2005 survey period, the two harvest estimates are not comparable due to changes in survey methodology during the 2001-2005 period. Auklets and murres were the most harvested seabirds in Alaska during both survey periods (Tables 3 and 4). The region with the highest seabird harvest during the 1995-2000 period was the Bering Strait/Norton Sound region with about 85% of the total statewide seabird harvest. That same region also had the highest seabird harvest (85%) during the 2001-2005 period.

The regions with the highest egg harvests during both survey periods were the Bering Strait/Norton Sound and Bristol Bay areas with 70% and 85% of the harvest, respectively. Murres and gulls represented the bulk of the egg harvest in Alaska during both survey periods; but, the percentages of the egg harvests during the two survey periods are quite different with murres representing 60% (1995-2000) and 38% (2001-2005), and gulls representing 36% (1995-2000) and 53% (2001-2005).

5. Seabird harvest methods

Past methods of harvesting seabirds include the use of nets on hand-held poles or clubs on St. Lawrence Island (Oozeva 1985; Uhl and Uhl 1977), Kodiak, and Little Diomede Island; baited fishhooks on lines in the Wainwright region (Nelson 1981); and slingshots and hand-catching of auklets on King Island (Paige *et al.* 1997). Although harvesting seabirds remains an important activity in many regions today, harvesting is now often done using motorized boats, blinds, and shotguns. Egg harvesting also remains an important summer activity but methods have not changed dramatically. People still gather murre eggs from cliffs by climbing with ropes or by hand.

Lisa Sheffield: ***High densities of seabirds.***

Table 3. Estimated annual seabird and egg harvest by region in Alaska, 1995-2001

	Northwest Alaska		Bering Strait/ Norton Sound		Yukon/ Kuskokwim Delta		Bristol Bay		Aleutian/ Pribilof Islands		Kodiak		Cook Inlet		Gulf of Alaska		Totals	
Species	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds
Yellow-billed Loons	-	-	10	39	14	74	4	44	-	-	-	-	-	-	-	-	28	157
Red-throated Loons	-	6	-	-	10	24	-	3	-	-	-	-	-	-	-	-	10	33
Common loons	8	71	79	215	61	270	19	30	-	-	-	-	-	-	-	-	167	586
Arctic/ loons	8	2	-	70	5	26	240	-	-	-	-	-	-	-	-	-	253	98
Unknown loons	-	-	20	12	-	-	-	-	-	-	-	-	-	2	-	3	20	17
Auklets	-	1	151	9,031	-	-	-	-	38	110	-	54	-	-	-	-	189	9,196
Murres	4,141	23	27,394	6,760	291	41	5,352	15	593	422	-	-	-	-	-	-	37,771	7,261
Guillemots	81	-	-	6	-	-	-	-	37	-	-	-	-	-	-	-	118	6
Cormorants	4	-	-	1,671	-	-	-	-	18	82	-	-	-	-	-	-	22	1,753
Black-legged kittiwakes	-	-	-	37	-	-	-	-	-	386	39	-	-	-	-	-	39	423
Red-legged kittiwakes	-	-	-	-	-	-	-	-	-	657	-	-	-	-	-	-	-	657
Murrelets	-	-	-	-	-	-	-	-	84	28	-	-	-	-	-	-	84	28
Unknown gulls	4,563	-	9,776	8	-	-	-	-	2,653	4	-	-	-	-	333	-	17,325	12
Mew gulls	2,034	40	-	-	407	48	3,098	57	-	-	1,150	-	-	-	-	-	6,689	145
Sabine gulls	52	-	-	-	344	39	2,910	19	-	-	-	-	-	-	-	-	3,306	58
Glaucous gulls	1,283	-	-	377	1,610	226	14,838	103	-	-	-	-	-	60	-	-	17,731	766
Glaucous-winged gulls	-	-	-	71	-	-	848	-	2,322	-	2,116	-	921	-	962	-	7,169	71
Herring gulls	-	-	-	62	-	-	-	-	2,276	-	177	-	-	-	-	-	2,453	62
Arctic terns	8	-	185	-	381	69	1,662	11	195	-	-	-	120	-	26	-	2,577	80
Puffins	-	-	93	78	-	-	-	-	55	148	-	-	-	-	-	-	148	226
Unknown seabirds	61	-	2,106	41	-	-	-	-	-	-	46	20	-	-	-	-	2,213	61
Red-necked grebes	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	-	-	4
Total	**12,243**	**143**	**39,814**	**18,480**	**3,123**	**817**	**28,971**	**282**	**8,271**	**1,839**	**3,528**	**74**	**1,041**	**62**	**1,321**	**3**	**98,312**	**21,700**

[1]Southeast Alaska harvest region was not surveyed during the 1995-2000 period. North Slope, Copper River Basin, and Interior harvest regions did not report harvesting seabirds or their eggs during the 1995-2000 period.

Sources: Wentworth & Wong 2001; Paige *et al.* 1996; ADF&G and Kawerak, Inc. 1997; Wong and Wentworth 2001; Georgette 2000; Wong *et al.* 2000, Brower and Opie 1996, 1997; Brower *et al.* 2000; Hepa *et al.* 1997; ADF&G 2001; Stovall 2000.

Table 4. Estimated annual seabird and egg harvest by region in Alaska, 2001-2005[1]

	North Slope[2]		Bering Strait/ Norton Sound[3]		Yukon/ Kuskokwim Delta[4]		Bristol Bay[5]		Aleutian/ Pribilof Islands[6]		Cook Inlet[7]		Copper River Basin[8]		Totals	
Species	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds	Eggs	Birds
Yellow-billed loons	-	3	-	181	14	55	-	78	-	-	-	-	-	-	14	317
Red-throated loons	-	-	27	21	25	41	-	13	-	-	-	-	-	-	52	75
Common loons	-	-	238	648	68	150	1	14	-	-	-	-	-	-	307	812
Arctic loons	-	-	164	266	96	214	22	4	-	-	-	-	-	-	282	484
Auklets	-	-	125	8,89	-	-	797	-	-	-	-	-	-	-	922	8,89
Murres	3,61	29	79,726	8,854	241	62	3,532	4	-	-	-	8	-	-	87,109	8,957
Guillemots	-	-	8	258	-	1	3	2	-	-	-	-	-	-	11	261
Cormorants	-	-	27	3,916	-	32	4	-	-	-	-	-	-	-	31	3,948
Black-legged kittiwakes	-	-	604	1,577	32	1	385	-	194	-	-	58	-	-	1,215	1,636
Red-legged kittiwakes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Murrelets	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown gulls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mew gulls	-	-	2,193	60	2,386	147	9,222	145	-	-	-	-	-	-	13,801	352
Sabine gulls	-	-	10	4	407	24	286	-	-	-	-	-	-	-	703	28
Glaucous gulls	229	-	8,4	998	2,577	193	12,034	259	13,423	130	-	506	-	-	36,663	2,086
Glaucous-winged gulls	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herring gulls	-	-	-	-	-	-	37	-	1,428	-	-	659	-	-	1,465	659
Arctic terns	84	11	817	20	542	44	857	11	108	-	-	371	-	-	2408	457
Puffins	-	-	168	57	4	121	-	-	259	1,212	-	29	-	-	431	1,419
Unknown seabirds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red-necked grebes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**3,923**	**43**	**92,507**	**25,75**	**6,392**	**1,085**	**27,18**	**530**	**15,412**	**1,342**	**-**	**1,631**	**-**	**-**	**145,414**	**30,381**

(1) Survey periods vary by region (see below). More current data for Kodiak, Interior, Northwest Arctic, Gulf of Alaska, and Southeast Alaska regions are not available.(2) 2005 survey (3)Average of 2004-2005 surveys.
(4) Average of 2001, 2002, 2004, and 2005 (5) Average of 2001, 2002, 2004, and 2005 bird surveys and 2004-2005 for egg surveys (6) 2005 survey (7) 2003 survey (8) 2004 survey. Source Wenthworth 2007.

6. Cultural and economic significance of the subsistence harvest of Alaskan seabirds harvest methods

Dating back thousands of years, Eskimo, Aleut, and Indian groups in Alaska gathered eggs and took birds for food and raw materials. These traditional uses continue to be part of a unique socioeconomic system in Alaska today (Department of the Interior 1980, Wolfe and Walker 1987). Subsistence harvests of migratory birds occur in rural areas where fishing and hunting are major components of the regional economy of Alaskan communities that are generally inaccessible by road. The resident populations are primarily Alaska Native living in communities ranging in size from less than 100 to as many as 4,000 people, although most village populations are under 400.

Rural communities are supported by a combination of cash and subsistence economies, wherein families support themselves through some combination of employment for wages, commercial fishing and trapping, and subsistence activities. Often, subsistence harvest activities are limited to a few individuals or families in a community who share the products of hunting, fishing and gathering with others. However, in areas where migratory bird harvest is greatest, it is common to find from 60% to 80% of households participating. Actual dollar values of subsistence seabird harvests in Alaska are difficult to quantify since seabirds and their eggs cannot be bought or sold. Replacement values could be implied based on prices for chicken and other meat products from commercial stores; however, this quantification has not been pursued. Chicken and commercial eggs, however, have neither the equivalent freshness nor quality of seabirds and their eggs, nor the same taste. Seabirds and their eggs are the culturally preferred food.

7. Outreach programs concerning seabird harvest in Alaska

Regularly scheduled outreach efforts for the spring/summer migratory bird subsistence harvest in Alaska include but are not limited to the activities listed below:

- Over 28,000 public regulation booklets and bird identification materials are distributed annually (April) to all rural mailbox holders living in areas open to subsistence harvesting.
- Brochures explaining the local migratory bird subsistence harvest regulations are sent to rural post offices within subsistence harvest areas each April.
- The AMBCC has a website which is continually being updated to include many new features such as links to species specific information.
- Community visits are conducted annually by FWS personnel to explain and clarify the harvest regulations at public meetings held in the hub communities of Barrow, Bethel, Kodiak, Nome, Kotzebue, Dillingham, Glennallen, Fairbanks, and Juneau.
- Public meetings of the AMBCC are held in Anchorage in the spring and fall of each year.
- Harvest information by region and species is posted on the AMBCC website and distributed routinely at AMBCC meetings.

8. Review of management recommendations developed for the CAFF Technical Report No.9 (Denlinger and Wohl 2001)

To determine potential impacts of subsistence harvests on Alaskan seabird populations, more qualitative information is needed on the harvests themselves and the population ecology of harvested colonies. To assess the magnitude and impact of the subsistence harvests on seabird populations in Alaska and to maintain the opportunity for rural residents to harvest seabirds at a sustainable level the recommendations listed below were suggested in 2001.

- *Recommendation 1:* Monitor seabird populations at selected colonies that are used for harvesting (especially in the Bering Sea region) to determine population status and trends.

  Status: There are about 1800 seabird colonies in Alaska. Although most of the colonies experience no harvest as they are not located near rural communities, a well-documented list of specific seabird colonies

which are used for harvesting does not exist at this time. However, even the few colonies that experience a harvest are not monitored. Several seabird colonies have and continue to be monitored as part of a popular, long-term monitoring program in Alaska. However, the few colonies that experience a harvest

are generally not included in the Alaska seabird monitoring program." In the past, the colonies at Little Diomede and those near Savoonga on St. Lawrence Island have been monitored.

- *Recommendation 2*: Maintain and update the Beringian Seabird Colony Catalog Database; conduct new censuses to improve population estimates.

  Status: The North Pacific Seabird Colony Catalog database is routinely updated, and is available on the Service's Migratory Bird Management website. Most of the 1800 colonies in Alaska have not been surveyed for 30-35 years. More emphasis should be placed on resurveying colonies in Alaska.

- *Recommendation 3*: Continue cooperative efforts with NWR (National Wildlife Refuges) Native organizations and Alaska Department of Fish and Game to collect and analyze data on subsistence harvests of seabirds in Alaska.

  Status: The Service's Migratory Bird Harvest Survey Program has maintained a close relationship with National Wildlife Refuges in Alaska, the Alaska Department of Fish and Game, and has contracted with these and several Native organizations to conduct harvest surveys in many rural communities. The bulk of the harvest survey is done by the Refuge system.

- *Recommendation 4*: Develop a license or permit system for the spring seabird harvest to improve the information on the number of hunters and their harvest.

  Status: A subsistence harvest license or permit requirement in Alaska has been strongly opposed by rural hunters. No license or permit program has been developed to date, and is currently not a high priority of the Service or the AMBCC.

- *Recommendation 5*: Improve harvest surveys to collect more reliable species-specific information.

  Status: A statewide subsistence harvest survey methodology was adopted by the AMBCC in 2003; it was implemented in 2004. As a result, more reliable seabird species-specific information has been collected. However, due to budget restrictions not all harvest regions and all communities within regions are sampled annually.

- *Recommendation 6:* Determine the economic value of consumptive and non-consumptive uses of seabirds in Alaska.

  Status: The economic value of the subsistence uses of seabirds can be estimated based on the weights of seabirds harvested. The non-consumptive value of seabirds has not been estimated and would require extensive study. Both economic estimates have not been a high priority for the Service's subsistence harvest program in Alaska.

- *Recommendation 7*: Document the role of seabird products in subsistence cultures in Alaska.

  Status: Few studies or reports have been published that document the social, cultural, and spiritual values of the seabird harvest in rural communities in Alaska. The intrinsic values of the seabird harvest should be better documented in the future.

- *Recommendation 8*: Work with rural Alaskans to collect traditional knowledge regarding seabirds and their harvests.

  Status: Information can be found in anthropological literature, including Alaska Department of Fish and Game subsistence reports.

- *Recommendation 9*: Conduct studies on the effects of human disturbance at seabird colonies to determine how to reduce those effects on seabirds during the harvest period.
  Status: No studies have been conducted on the effects of disturbances at colonies as a result of bird and egg collection activities. The Service considers such studies a low priority.

- *Recommendation 10*: Reduce disturbances at seabird colonies during breeding season by restricting the distance from the colony that shooting can take place.

  Status: Use of firearms to harvest seabirds is limited making this recommendation a low priority.

- *Recommendation 11*: Reduce the subsistence harvest of seabird species that are declining significantly at specific colonies.

  Status: Of the 72 species of seabirds occurring in Alaska, 41 species were not requested by rural communities to be on the harvest list, leaving currently 30 species of seabirds that are open to harvest. The red-faced cormorant was removed from the harvest list in 1994. The list of species open to harvest is reviewed annually by the AMBCC, and proposals to change the list are solicited annually by the Service.

- *Recommendation 12:* Develop or improve outreach and education programs and disseminate seabird harvest information to rural communities thereby reducing unnecessary disturbance at harvested seabird colonies.

  Status: The Service has developed a website to report on AMBCC activities. Harvest information documents are distributed periodically.

- *Recommendation 13:* Continue participation in international fora that provide opportunities to improve seabird harvest management in Alaska.

  Status: The Service in Alaska participates in the Arctic Council, Conservation of Flora and Fauna programs' Circumpolar Seabird Expert Group which has an active project concerning seabird harvest in the eight arctic countries. The Service also coordinates with Russian colleagues concerning documenting Russia's harvest of shared migratory bird populations in the Russian Far East.

9. Current priority recommendations

Given the maturation of the AMBCC and the seabird harvest program in Alaska since 2001, the recommendations listed below are considered high priorities for the future.

- Expand the survey program to collect seabird harvest information annually in select regions or specific communities within regions that harvest large numbers of seabirds and seabird eggs, e.g., Bering Strait/Norton Sound, Bristol Bay, and Northwest Alaska.
- Document which seabird colonies are harvested, and conduct seabird population surveys at those colonies; e.g., Little Diomede and St Lawrence Island regions.
- Improve the documentation of the socioeconomic, cultural, and spiritual values and uses of seabirds and seabird harvests in select rural communities in Alaska.
- Continue to participate in international migratory bird fora to help document harvests of shared populations of migratory birds in the circumpolar arctic, and to coordinate and cooperate to improve harvest programs.
- Continue to coordinate and collaborate with the State of Alaska, Alaska Native organizations, and National Wildlife Refuges (especially Native Refuge Information Technicians) to improve the implementation of the seabird harvest survey program, including documentation of specific colonies that are used for harvest and improve species identification of birds and eggs that are harvested.
- Increase financial support of the harvest survey program to collect more comprehensive data in more harvest regions on an annual basis, and conduct more timely analysis and publication of harvest information.
- Work with Alaska Natives and Native Refuge Information Technicians to collect traditional ecological knowledge regarding seabird movements, timing of movements, breeding phenology, local colony population trends and harvest methodologies.
- Develop outreach materials targeting Alaska's Species of Conservation Concern that are seabirds and that are open for harvest.

- Increase the focus of the effects of climate change in Alaska on bird populations used for subsistence.

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Seabird Harvest in Canada

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1. Introduction

There is a long history of seabird harvesting in Canada dating back thousands of years to early colonization by indigenous peoples of coastal areas in the Arctic, Pacific and Atlantic regions. On the Atlantic coast, seasonal fishermen and settlers from Europe established, or brought with them, a seabird hunting tradition which has continued to the present. Historically, seabirds were an important component of the subsistence way of life for coastal peoples and provided meat for human food, dog food, or fish bait, oil, feathers and skins for clothing. Eggs were also routinely harvested for human consumption.

With the advent of migratory bird protection in North America dating from early in the 20th century and shifts away from subsistence living, consumptive use of seabirds has declined. Today, seabird harvesting, whether for birds or their eggs, is much less widespread, although improvements in hunting efficiency (better guns and ammunition, and better boats) have tended to increase harvests for species such at murres.

Seabird harvest in Canada mainly involves auks and eiders. These species are legally harvested by native peoples in all coastal regions of Canada. Eiders are hunted by non-native people mainly in Atlantic Canada. In Newfoundland and Labrador residents legally hunt thick-billed and common murres. Several species of seabirds are taken illegally by non-native people mainly in Newfoundland and Labrador and in Québec on the North Shore of the Gulf of St. Lawrence, although this practice is becoming less and less frequent. Egging is most common in the Arctic where native people harvest the eggs of auks, gulls,

Greg Robertson: ***A successful day in the Newfoundland murre hunt***

terns, and eiders. Egging elsewhere is not a common practice although common eider colonies in Labrador may still be impacted. The extent of the harvest of seabird species by native people in the interior of Canada is unknown at present.

2. Harvest regulations and harvest survey methods in Canada

All Canadian seabirds with the exception of cormorants (Phalacrocoracidae) are considered migratory birds and as such are protected under federal legislation. Cormorants are protected by provincial legislation. Protection of migratory birds in Canada is accomplished through regulations set out in the *Migratory Birds Convention Act* (MBCA) of 1917, which brought into law provisions of the Migratory Birds Convention (MBC), a treaty signed by the United States and the United Kingdom on behalf of Canada in 1916.

In the MBCA, all seabirds with the exception of eiders are classified as migratory *non-game* birds and are protected from hunting all year. Native people are except from this restriction and at any time are allowed to take various auk species (and scoters) for human food and clothing. Eiders are classified as migratory *game* birds and a strictly controlled annual hunt is allowed for native and non-native people. Migratory game bird hunters must purchase a migratory game bird hunting permit annually. Native people are exempt from this requirement. It is illegal to take the eggs of any migratory bird in Canada, however, native people are allowed to take the eggs of auks.

Much of Canada's Arctic is now administered by aboriginal governments, formed under a variety of Land Claim Agreements (Inuvialuit (western Arctic) - 1984, Nunavut (eastern Arctic) - 1993 and Nunatsiavut (Labrador) - 2006). With respect to wildlife management, all Land Claim Agreements have provisions for establishing wildlife co-management boards, which form the basis of decision making in wildlife (and fishery) matters.

These boards generally have members from relevant federal departments, aboriginal governments, and regional and local representation of Inuit harvesters. In general, they take a total allowable harvest/catch (TAH/C) approach, in which quotas that can be harvested are set and allocated to various groups, with aboriginal groups having first rights of access. With respect to birds, this approach does not mirror the North American continental approach for game bird management, which is based on restricting season lengths and bag and possession limits to regulate harvest. Work is currently underway in Canada to integrate these two approaches to game (and non-game) bird management.

Before Newfoundland joined Canada in 1949, murres and other seabirds could be legally hunted by Newfoundland residents. After confederation, Newfoundland came under Canadian law, which suddenly meant that migratory non-game birds such as auks, gulls and the like could not be hunted legally. After much negotiation, a special regulation was added to the MBCA, which allowed residents of the province of Newfoundland and Labrador to hunt murres in that province only. More recently the MBCA itself has been amended to allow for the special case of a murre hunt in Newfoundland and Labrador. Until 1993, murres could be hunted between 1 September and 31 March, with no restrictions on the number taken, and with no permit requirement.

From 1993-2000 hunting restrictions were imposed under an Administrative Order of the MBCA, which limited the daily bag to 20 birds and 40 birds in a hunter's possession, shortened the hunting season to a little over three months in each of four hunting zones, allowed hunting from a moving boat, and permitted the use of lead shot. These restrictions were formalized as Regulations in 2000, which now allow for annual setting of bag limits and season lengths.

In 2001, a further regulation was added to require murre hunters to possess a Migratory Game Bird Hunting Permit, which provides a mechanism for more effective sampling of hunters to assess total harvest. Since 2001, an increase in sales of permits by murre hunters occurred; the additional proceeds from the Habitat Conservation Stamp purchased with the permit ($8.50) are allocated annually to a special fund dedicated to support murre conservation and research.

The MBCA specifies that it is illegal to sell migratory birds in Canada so "market hunting" is not allowed. Migratory game birds and murres can be given away if taken legally.

Cormorants are under the jurisdiction of each of the 10 provinces of Canada and the level of protection varies considerably across the country. In many places, cormorants are considered pests because of the perception that they consume significant quantities of valuable commercial fish. For example, open hunting seasons on cormorants are, or have been in place in the Maritime provinces of Nova Scotia, Prince Edward Island and New Brunswick for the purposes of population control.

The harvest of migratory game birds is monitoring by two surveys in Canada, the National Harvest Survey and the Species Composition Survey. Both are based on sampling hunters, who are identified when they purchase a Migratory Game Bird Hunting Permit. In the National Harvest Survey, hunters are asked to recall the numbers of birds (geese and ducks) taken over the hunting season, and mark these numbers on a calendar provided. These surveys are mailed out in early winter.

The Species Composition Survey involves sampling a different set of hunters, who are asked to participate beforehand. Positive respondents are sent special envelopes with plastic linings and are asked to put a wing (ducks) or tail fan (geese) in each envelope and record the location where the bird was shot. These wings and tails are gathered and identified to species and age at an annual week-long meeting at the end of January. The sample of hunters selected for these surveys is stratified to insure appropriate regional representation, and performs well for common species, such as mallards and black ducks.

However, seaducks and other species hunted late in the season, and rare species, are not as well represented, as the regime is really designed to capture the large duck and goose harvest during fall migration. Murres are currently not included in the survey either, even though techniques to age and identify species of murres are now available (S. Wilhelm et al 2008). Work is underway to resolve both of these issues.

3. Locations, species and numbers of seabirds harvested in Canada

There is no comprehensive scheme within Canada to monitor seabird harvests, however, some information is available for local areas or particular species. By

Greg Robertson: ***Retrieving a "murre", The Newfoundland Murre hunt***

virtue of the fact that eiders are game birds, their harvest is monitored on an annual basis by the Canadian Wildlife Service (CWS). Also, periodic, special surveys have been conducted to assess the murre harvest in Newfoundland and Labrador.

Information on seabird harvest on the Québec North Shore dating from the early 1980s is available as a result of an education project conducted in the area by the Québec-Labrador Foundation (see Blanchard 1984, 1994). Quantitative data are generally scant for the Northwest Territories and Nunavut, although a recent native harvest survey conducted in Nunavut is providing valuable information for that region.

3.1 Arctic and Northern Canada

The common eider, thick-billed murre, and black guillemot, are the most commonly harvested seabirds in Arctic Canada (Wong 1985, Gamble 1987ab, Donaldson 1988). These species are part of the native diet wherever they are available; however, they are most commonly hunted by people who live close to seabird concentrations such as breeding colonies along coasts. Important seabird harvesting communities in Arctic Canada are Kinngait (Cape Dorset), Kimmirut (Lake Harbour), Mittimatalik (Pond Inlet), Ivujivik, Pangnirtung, and Sanikiluaq (Brown 1975, Donaldson 1988).

Eider harvest is assessed by CWS annually across Canada, using a mail-out survey to purchasers of migratory game bird hunting permits (Lévesque *et al.* 1993). This method severely underestimates actual harvest in the Arctic because almost no northern residents are required to purchase such a permit because of their aboriginal status and thus the hunter base is uncertain. Additionally, the human demography of Nunavut has changed dramatically in recent decades, and is dominated by people under the age of 20. The importance of hunting in general and harvest of seabirds in particular, will need to be continually assessed because of these demographic shifts among the young, and growing human population there.

A harvest study was conducted among communities in Nunavut over 3 years, and forms the basis of aboriginal “Basic Needs” and estimates of wildlife harvest. The only marine bird species quantified were the king and common eider, and harvest levels were likely underestimated. Despite these limitations, these surveys and related hunter interviews confirmed earlier reports that suggested that common eiders are the most commonly hunted seabird in Nunavut. Donaldson (1988) estimated that ca. 11,000-15,000 birds were harvested each year in the Baffin region (Ellesmere Island to islands off northern Quebec including Belcher Islands in Hudson Bay). The Nunavut Harvest Study also confirmed that Sanikiluaq in southern Hudson Bay, and Kinngait (Cape Dorset) along the south coast of Baffin Island, were the most important communities for eider hunting.

Numbers of murres taken per year in the Arctic are relatively small. Estimated annual harvest of thick-billed murres at Kinngait varied from 619 birds in 1983 to 1,330 birds in 1982. Annual harvest for Kimmirut varied from 242 in 1983 to 500 in 1981 (Donaldson 1988). Gaston *et al.* (1985) estimated that up to 2,000 murres were taken annually at the Digges Sound colonies by hunters from Ivujivik. Sanikiluaq in the Belcher Islands, Hudson Bay, is an important community for black guillemot harvest, however, annual harvest is small, ranging from 60 birds in 1981 to 468 birds in 1983 (Donaldson 1988).

In summary, the total annual seabird harvest in Arctic Canada is difficult to estimate but is probably less than 25,000 birds of which about half are common eiders. Previously, Donaldson (1988) estimated that, of about 15,000 birds taken annually in the Baffin Region communities of Arctic Canada, about 80% of the harvest was common eiders, 13% Thick-billed murres and the balance black guillemots. An additional 2,000 murres per annum are taken by the community of Ivujivik, in northern Québec (Gaston *et al.* 1985).

Based on the level of public interest and concern for their conservation, it is clear that eiders are by far the most popular seabird taken by native people in Arctic Canada, and that harvest levels within the Canadian north are sustainable at this time. However, some eider colonies in very close proximity to communities may have been extirpated.

Of greater concern is that large numbers of northern common eiders that breed in Nunavut migrate to winter in southwest Greenland and Atlantic Canada, where levels of harvest can be high. Recent changes to Greenland seabird harvest regulations were

G.Gilchrist: *Eider hunting in the Belcher Islands.*

initiated in part out of concern that the Greenland harvest was suspected of having negative impacts on the Canadian breeding population. The Greenland harvest of northern eiders has been greatly reduced due to regulatory changes (see, Seabird harvest in Greenland, this volume), and preliminary results suggest that the survival rate of female eiders breeding in Canada have already increased by a detectable amount.

Harvest of seabird eggs in Arctic Canada is not as widespread as bird hunting and usually involves ground nesting common eiders, arctic terns, and *Larus* gulls (Wong 1985). Thick-billed murre eggs are collected from accessible locations at the Digges Sound colonies by native people from Ivujivik (Gaston *et al.* 1985), and at the Cape Graham Moore colony on Bylot Island by residents of Mittimatalik (Pond Inlet) (A.J. Gaston, per. comm.). Egging at Cape Graham Moore may be the most regular seabird harvest that occurs in the Arctic as people visit annually and make use of climbing ropes fixed permanently to the cliff (A.J. Gaston, pers. comm.).

Little data exist on the level of seabird egg harvesting in the Arctic but it appears to be low (Wong 1985). About 2,000-3,000 murre eggs are collected annually from Digges Sound colonies (Gaston *et al.* 1985), and "several thousand" are taken from the Cape Graham Moore colony annually (A.J. Gaston, pers. comm.).

Information on seabird harvest by native people across the interior of northern Canada could not be found. In this region, ground nesting species such as gulls, terns and jaegers breed, and it is likely that native people make some use of these birds. Seabirds do not appear to be harvested in the Ontario portion of Hudson and James Bay lowlands (Berkes *et al.* 1994).

3.2 Atlantic Canada

Seabird harvesting in Atlantic Canada takes place mainly in Labrador, insular Newfoundland and the Québec North Shore. Eiders are hunted in the Maritime provinces of Nova Scotia, and New Brunswick. Mainly non-native people hunt seabirds in insular Newfoundland, the Québec North Shore, and the Maritimes, while both native and non-native people do so in Labrador.

3.2.1 The murre hunt in Newfoundland and Labrador

By far the largest and most significant consumptive use of seabirds in Canada occurs in Newfoundland and Labrador where thousands of hunters legally take thick-billed and common murres (locally known as "turrs") during the winter. Murres are shot in inshore areas and bays from small boats (see Elliot 1991).

The size of the annual murre harvest has been estimated several times over the past 40 years. Early estimates by Tuck (1961) suggested that about 200,000 murres, mainly thick-bills, were harvested annually. More recent estimates in the late 1970s through 1980s when hunting restrictions were not in place indicated an annual harvest of 600,000-900,000 birds of which 95% were thick-billed murres (Elliot *et al.* 1991). Starting in September 1993, restrictions in the form of bag and possession limits, and shorter hunting seasons, were put in place to reduce the harvest by half.

In the mid-1990s, three murre harvest surveys were conducted, which show that the annual harvest was reduced substantially to about 200,000-300,000 birds per year (Chardine *et al.* 1999). Two additional surveys were conducted after hunters were required to purchase permits (2001 and 2002), and estimates were 160,000-190,000 murres taken annually, a further reduction in the total harvest. Observations from the thick-billed murre colony at Coats Island suggest that the number of young birds and potential recruits has increased since the hunting restrictions were imposed, although other hypothesised impacts of reduced harvest have not been observed, such as a change in adult survival (Gaston 2002).

Wiese *et al.* (2004) showed that harvest levels are impacting thick-billed murre populations in Canada, but alone, would not cause a decline in the population under current conditions. Recent comparisons of recovery rates of thick-billed murres banded in the low Arctic and common murres banded in Newfoundland and Labrador suggest that young common murres are harvested at higher rates than previously thought, especially birds hatched in Labrador. It is unclear whether common murres have always been harvested at high rates, as thick-billed murres were the focus of early work as they composed the largest component of the harvest.

Prior to the advent of hunting restrictions, it was estimated that one in three murres taken in Newfoundland and Labrador was illegally sold or bartered in an "underground" market (Elliot 1991). This proportion probably declined as a result of the hunter liaison and education program conducted in the early 1980s (see Elliot 1991) and has likely declined further now that hunting restrictions are in place. Nevertheless, it is still considered a motivating factor in over-hunting by some individuals, and enforcement efforts continue to focus on stopping illegal sales of murres (and other marine birds).

3.2.2 Eider hunting in Atlantic Canada

Eiders are popular game birds throughout Atlantic Canada, particularly so in Newfoundland and Labrador, Nova Scotia and the Gulf of St. Lawrence, Quebec. Very few king eiders are killed (Wendt and Silieff 1986, Lévesque *et al.* 1993) and the following comments apply to the common eider. Estimates of the size of the eider harvest in eastern Canada vary widely and it is difficult to provide a definitive number. Special surveys of sea duck harvest in Newfoundland and Labrador in the late 1970s suggested an annual harvest for all species of over 100,000 birds, of which an estimated 75,000 were common eiders. National harvest surveys during the same period estimated eider harvests in the order of 15,000 per annum (Wendt and Silieff 1986).

More recent national harvest surveys suggest that about 20,000 eiders were harvested annually in Atlantic Canada from 1988-1991 (Lévesque *et al.* 1993) with about 43% killed in Newfoundland and Labrador, 41% in Nova Scotia, 12% in Québec, and 3% in New Brunswick. Northland Associates (1986) estimated that over 30,000 eiders (probably common eiders) were harvested on the Labrador coast alone in 1980. Most recently in 1996-2001, annual harvest of northern common eiders was estimated at 13,000 for Newfoundland and Québec. Poaching and alleged hunting is widespread in the region but likely varies annually in relation to hunting accessibility due to sea ice, and poached birds are unlikely to be reported. Many people in Labrador are not required to buy a hunting permit because of their native status and so would not be counted in the hunter base. Furthermore, national harvest surveys are conducted too early in the year to assess the eider harvest effectively, and alternative approaches to more accurately assess the harvest are being considered by the Canadian Wildlife Service.

Common eiders breed in many parts of Atlantic Canada and egging was probably widespread in the past. Eider colonies on the coast of Labrador probably were heavily egged by seasonal fishermen arriving for the summer fishery. This has likely diminished with the reduction in ground fish fishing activity in the east coasts of Newfoundland and Labrador since 1992. Common eider populations in Labrador are currently increasing (Chaulk *et al.* 2005).

3.2.2 Other Seabirds

In Labrador, some coastal native people legally hunt atlantic puffin, dovekie, razorbill and black guillemot (Northland Assoc. 1986). In addition, non-native people in Labrador, insular Newfoundland, and the Québec North Shore illegally harvest these and other species such as shearwaters, large *Larus* gulls, black-legged kittiwakes, and terns (*Sterna* spp.; Northland Assoc. 1986, Blanchard 1994, CWS unpubl. files). Seabird eggs are collected for food in Labrador and the Québec North Shore. Egg collecting is uncommon in insular Newfoundland.

Little quantitative information is available on the size of these harvests. Northland Associates (1986) estimated that ca. 17,000 black guillemots were taken in 1980 on the whole Labrador coast. Given estimates of guillemot populations in this region (e.g., Nettleship and Evans 1985), the estimate appears high, however, it may also indicate that the number of guillemots in the area is an underestimate. This report

also provides estimates of other seabird harvests (in autumn) on the Labrador coast as follows: razorbills over 4,000 birds, dovekies over 2,000 birds, atlantic puffins over 6,000 birds, and black-legged kittiwakes ca. 1,000 birds.

There are no data on the harvest levels of seabirds other than murres and eiders in insular Newfoundland. It is well known that hunters take razorbills, and also atlantic puffins, dovekies, and black-legged kittiwakes, despite enforcement efforts, and the common, though not universal, knowledge that these activities are illegal. Of particular concern is that an unknown but perhaps significant number of razorbills is taken either purposely or accidentally during the Newfoundland murre hunt (Lavers 2007).

On the Québec North Shore, local harvest levels were considered large enough to have reduced seabird populations in the area. In a survey of the 1981 hunting season conducted by Blanchard (1984), respondents identified herring gull as the most commonly collected egg, black guillemot as the most commonly harvested chick (presumably fledglings), and common eider as the most commonly hunted adult seabird. A program to inform and educate the local population of the Québec North Shore appears to have reduced seabird harvest in that area and allowed local populations to increase (Blanchard 1994).

4. International matters

Given the long known fact that many thick-billed murres use both Greenland and Canada as part of their annual life cycle, harvest management in Canada has taken into consideration the Greenland breeding populations and the harvest in Greenland (Tuck 1961, Elliot et al, 1991). More recently, the strong link between common and king eiders (and other seaducks) breeding in the eastern Canadian Arctic and wintering populations in Greenland, has made joint initiatives to manage and monitor populations of eiders highly important.

In general, Canadian and Greenlandic combined efforts to monitor and regulate harvest have worked very well. Thick-billed murres from Iceland, Norway and as far east as Russia also are taken in the Newfoundland murre hunt, but the impact of the Canadian hunt on these breeding populations is not well known due to limited banding and recovery information, so more formal assessment of the effects of the Canadian harvest on these populations has not been undertaken.

5. Cultural and economic significance of the seabird harvest in Canada

No objective analysis of the cultural significance of seabird harvesting in Canada is available; however, general comment is possible. Seabirds are taken widely by native people across Canada but probably nowhere do they form a significant portion of the diet on an annual basis (e.g., Gamble 1987a, 1987b). It is likely that at most locations, seabirds are taken opportunistically by native people while carrying out other hunting activities (G. Gilchrist pers. comm.). Exceptions are a few communities in the Arctic where seabird hunting trips are purposely made to local murre or eider colonies.

In Labrador, insular Newfoundland, and the Québec North Shore, seabird hunting remains a very popular activity. In Newfoundland, the number of murre hunters was estimated to be over 10,000 (Elliot *et al.* 1991) and about 30% of these also hunt eiders (CWS unpubl. files). More recently the number of murre hunters in Newfoundland and Labrador has likely declined (Chardine *et al.* 1999) as has the number of migratory game bird hunters.

Historically, seabirds provided a ready and abundant supply of fresh meat, particularly welcome during the winter months when alternative fresh foods were limited. A holdover to this subsistence way of life remains today and seabird hunting is considered a “right” by many people. The murre harvest in Newfoundland and Labrador provided an estimated 300 metric tonnes of meat per annum (assuming 400 g of meat per bird) before hunting restrictions were put in place, and about half that now (Chardine *et al.* 1999), so it is easy to see the importance of this harvest to the people of Newfoundland. The CWS recognizes the cultural significance of the murre hunt to Newfoundlanders and is committed to maintaining a sustainable harvest into the future.

6. Outreach programs in Canada

Programs to reduce seabird harvesting in Canada have been aimed at illegal hunting and selling of birds, and at unsustainable harvests. The Québec-Labrador Foundation mounted an information, education and enforcement program in co-operation with the CWS

on the Québec North Shore in 1978 (Blanchard 1994). There, illegal and widespread hunting was thought to be a factor contributing to population declines of seabirds in the area. The program was considered a success in that the desired results of (1) seabird population increases, (2) enhanced local knowledge and attitudes towards wildlife regulations, (3) decline in illegal harvest, and (4) increased support and participation by residents of the area in the seabird management program, were achieved. However, the lasting benefits of this program remain to be determined (K. Blanchard, pers. comm.).

In Newfoundland and Labrador, enhanced communication and consultation with seabird hunters began in the mid-1980s (Elliot 1991). This program was focused mainly on the very large harvest of murres and the widespread problem of selling birds. It involved repeated visits to 175 coastal communities by seabird experts, and emphasized mutual respect and two-way communication of sound biological and conservation principles between resource managers and hunters. Although the effects of the program have not been measured systematically, it is generally felt that it was very successful (R.D. Elliot pers. comm.).

Likely as a direct result of the program, increasing numbers of hunters called for murre hunting restrictions in the form of a bag limit, and recently hunters were directly involved with the CWS in the establishment of the new hunting restrictions. High levels of compliance with the new restrictions together with positive comments from the majority of hunters suggest that a reduced harvest and hunting restrictions are strongly supported.

7. Management Recommendations

Previous recommendations from 1999 report and progress

- Improve knowledge of the level of seabird harvest and the species concerned, focusing initially on regions where harvest is thought to be substantial and little information currently exists. A top priority is to gather this information for razorbills and atlantic puffins hunted in Newfoundland and Labrador, and for all seabird harvest in the Arctic.

  Progress: Nunavut Wildlife Harvest Survey implemented and completed; however, limited bird information was collected, especially for rare species. Little new information on harvest of rare species, but likely declining due to reduced overall harvest.

- Regularly monitor the annual harvest of murres in Newfoundland and Labrador.

  Progress: Surveys undertaken in 2001 and 2002, annual surveys not yet implemented.

- Require a permit to hunt murres in Newfoundland and Labrador so that more accurate harvest estimates can be made.

  Progress: Hunters required to purchase a permit in 2001. Compliance from hunters has been very good.

- Periodically review the sustainability of the Newfoundland and Labrador murre hunt and make adjustments to hunting restrictions as appropriate.

  Progress: Current harvest levels appear to be sustainable, some minor season and zoning adjustments have been made.

- Closely monitor populations of heavily harvested species such as the thick-billed murre and common eider at the breeding colonies and in over-wintering areas.

  Progress: Thick-billed murre monitoring continues at Coats Island. Common eider monitoring has increased over much of eastern Canadian range, notably breeding surveys in Ungava Bay and Hudson Strait, Southampton Island and Labrador. Wintering surveys of all eastern North American eiders occurred in 2006.

- Where illegal and/or unsustainable seabird harvest occurs, or where the sale of seabirds is common, mount information/education and enforcement programs to reduce or eliminate these activities. Use as models either the Québec-Labrador Foundation program in Québec North Shore (Blanchard 1984) or the CWS Newfoundland program (Elliot 1991) as appropriate. The razorbill harvest in Newfoundland and Labrador and the illegal sale of murres and eiders in insular Newfoundland are high priorities.

  Progress: Enforcement activities continue to focus on the illegal sale of birds, especially organized

groups selling birds. A number of significant investigations and convictions have occurred.

New management recommendations

- Continue to closely monitor populations of heavily harvested species such as the thick-billed murre and common eider at the breeding colonies and in over-wintering areas.
- Improve knowledge for other species such as common murres and razorbills taken in the murre hunt
- Bring murres into the game bird harvest monitoring programs in Canada, specifically the National Harvest Survey and the Species Composition Survey, so the annual harvest of murres and composition of that harvest is monitored in Newfoundland and Labrador.
- Resolve issues related to late-season harvest and the timing of the National Harvest Survey, so that better harvest estimates of seaducks and specifically common eiders are obtained
- Periodically review the sustainability of the Newfoundland and Labrador murre hunt and the Atlantic common eider hunt, and make adjustments to hunting restrictions as appropriate.
- Work with co-management boards to integrate non-Aboriginal game bird management harvest regimes with co-management board total allowable harvest approach
- Where illegal and/or unsustainable seabird harvest occurs, or where the sale of seabirds is common, mount information/education and enforcement programs to reduce or eliminate these activities. Use as models either the Québec-Labrador Foundation program in Québec North Shore (Blanchard 1984) or the CWS Newfoundland program (Elliot 1991) as appropriate. The Razorbill harvest in Newfoundland and Labrador and the illegal sale of murres and eiders in insular Newfoundland are high priorities.

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Seabird Harvest in the Faroe islands

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1. Introduction

Harvesting seabirds has a long tradition in the Faroes and when the first law of hunting was passed in the Danish Parliament in 1854 a Faroese member made the following statement: ”Sea bird fowling in the Faroe Islands is conducted in a very special way, aiming at maintaining this important way of living for generations to come” (Nørrevang 1986). Although the colonies were extensively exploited, Nørrevang (1977, 1986) state that there is no evidence that the fowling had any negative effect on the seabird populations. Shooting, especially murres, became very common from early in the last century. It occurred mainly in summer close to land.

However, the sea area within 3 miles from the murre colonies and ½ mile from puffin colonies was protected. Most of these hunters came from larger villages and as the way of living changed with more leisure time, the hunting pressure increased at the same time as there was a decline in the murre population (Olsen 1982). In 1980 murres and razorbills therefore became protected against all hunting in the breeding season but it is allowed to shoot these birds in winter. By using better boats it is possible to hunt guillemots, razorbills and puffins in the winter out to about 10-20 miles from land.

2. Harvest regulations and harvest survey methods

The harvest is regulated with the harvest low from 1954 (Dam 1974). The legislation has been changed

B. Olsen: *Boats searching for newly fledged fulmars in the Faroes*

Table 1. Seabirds that can be hunted in the Faroes, hunting seasons, estimated numbers taken and total population size.

	Hunting season	Numbers taken			Population (pairs)
		Eggs	Fledglings	Adults	
Fulmar	all year	1,000-10,000	50,000-100,000	1,000-10,000	600,000
Manx Shearwater	all year*	0	1,000-5,000	0	25,000
Gannet	all year	0	300-600	0	2,350
Shag	1 Oct to 30 Nov	0	0	500-1,500	1,500
Arctic Skua	all year	0	0	0	900
Great Skua	all year	0	0	0	500
Gulls	all year	0-500	0	100-500	13,000
Kittiwake	all year	0	0	100-1,000	160,000
Murre	1 Oct to 20 Jan	0-1000	0	1,000-10,000	100,000
Razorbill	1 Oct to 20 Jan	0	0	1,000-10,000	4,500
Puffins	1 Oct to 20 Jan**	0	0-1,000	10,000-100,000	550,000

*Only the young of manx shearwaters can be taken. ** The hunting season is for shooting puffins. About 2,000 puffins are shot while the rest is fowled in the summer. The puffins are taken out of the air with the fleygastong, a net between two thin arms on a long pole. The population sizes are from Jensen et. al (2005).

regularly since and has become more restrictive. In general hunting on land is restricted to the landowners, while hunting on the sea is free to all having Danish civil rights.

Ownership and Fowling Rights. Fowling rights on land are closely related to ownership. Murre cliffs are property of the boarding outfield or - in some cases - of the whole village, while puffin colonies have more restricted ownership; sometimes belonging to the owners of infield lots and in some cases to the outfield owners. The ownership, fowling rights and sharing of the catches is described in more details by Nørrevang (1979) and Olsen and Nørrevang (2005).

As the tradition increased for shooting birds at sea and taking young fulmars at sea, the privilege of the landowner to hunt changed, as all the inhabitants could hunt at sea. At the same time as more of the hunting occurred away from the bird colonies it became more difficult to know the number hunted and to be aware of population changes and the possible negative effect of the hunting. It also became more difficult to make regulations, as the regulations for shooting had to be for the whole country.

Fowling and fowling methods. Fowling used to be in the summer when the birds, especially guillemots and puffins, gathered in the dense breeding colonies. The birds were mainly fowled with the fleygastong, which is an old Faroese fowling tool which still is used for puffins and fulmars. The fleygastong is a net between two thin arms on a long pole. The fowlers seek or actually build hideouts “sessir” so that the man cannot be seen by the birds passing by. The fowler will be facing the flying birds and throwing the net up to take the bird. Fowling in the summer now only includes the puffin, manx shearwater, gannet and fulmar. However, by license the eggs of guillemots can be taken in some colonies. In the winter guillemots, razorbills, puffins and shags are shot, and fulmars are taken with the fleygastong.

There is no hunting statistic for the Faroes, so the total figures given here are only guesses. However, since 1989 we have got the number of hunted gannets each year and for the puffins we know the number from a few places during the last decades.

3. Locations, species and numbers harvested

The hunting occur either in the colonies or on the sea. In the colonies the owners may regulate the hunting within each colony. This has been done by restricting the number of days, hunting is allowed, the time at day the fowling has to start and end, and in a few places there is a maximum harvest for each season. On land it is only allowed to take the birds with the hand or using the fleygastong. On the sea shooting of seabirds is allowed and it mainly occur in winter.

It is allowed to hunt fulmars, manx shearwaters, gannets, shags, arctic skuas, great skuas, gulls, kittiwakes, guillemots, razorbills and puffins. The hunting season for each species, the estimated harvest and population size is given in Table 1.

Northern fulmar

The fulmar started to breed in the Faroes in 1839 or possibly 1816 and already in the 1860s the population had grown to a size that was hunted (Müller 1862, Fisher 1952) and it is now the most important fowl in the Faroes. Both eggs, young and adults are taken, and the hunting methods used for other cliff breeding seabirds are adapted for the fulmars.

The eggs are taken around the 20th of May. In most places the egging is not as well organized as it was for murres (cf. Nørrevang 1977 and 1986) and one of the reasons is that the fulmar breed in more accessible areas.

In a few places young fulmars are taken on their nests when they are fully grown, and that was the old method. Now most of the birds are taken as newly fledged young when they are sitting on the water not able to fly because they are too fat. This fowling occurs during the fledging period from about the 20th of August to the 10th of September. In this period young fulmars are landing on the sea beneath the breeding areas end are drifting with the current and wind among the islands and also far out at sea. The birds are then picked up from boats with a deep landing net. In good weather this goes quite easy but when windy, many of the birds may escape. Normally each boat with 2 or 3 persons take 50-200 fulmars a day and some boats may take up to 500. Most of the fowlers only go out once each season, but a few take the opportunity to make money out of it and these boats with 2-4 men may take about 5,000 birds per boat during the season. An oven-ready young fulmar has a value of almost 4 pounds so although the fowling and preparation is a dirty job, it may make a good income. In total 50,000 to 100,000 young are taken each year.

The best way to exploit the population is to take the newly fledged young, but as fulmars first start to breed at an age of about 10 years, the effect of taking too many young will be delayed and difficult to detect. The fulmar population has been increasing since the fulmar first started to breed in the Faroes, but now the increase apparently has stopped or there may even be a decline. Already in the early 1930s no less than 80,000 young were being killed annually (Fisher 1952) which is in the same order as today and still the population has been increasing. Hunting fulmars was however banned by law from 1938 to 1954 as psittacosis was recognized in the Faroese fulmar.

Immature and adult fulmars may be taken with the fleygastong year round, but the main fowling is from March to May. A few thousands are taken in this way.

Manx shearwater

Adult manx shearwaters are protected, while the chicks are much sought for food e.g. on Skúvoy, Sandoy and Koltur. The fowling is done at night and the young birds are dazzled with an electric torch as they are sitting in the entrance or in front of the burrows at night. The total catch is 1,000 - 5,000 birds.

Northern Gannet

There is only one gannet colony in the Faroes and there is no indication that gannets have nested in other places. The colony is of old origin and its location was already mentioned in 1673 (Debes 1673). The majority have their nests on a fairly wide shelf which runs

B. Olsen: *Harvest of a newly fledged fulmar.*

along the precipitous north face of Mykineshólmur and on two neighboring stacks, Píkarsdrandgur and Flatidrangur. The gannets have been exploited as long as we know and according to Svabo (1976) about 200 adults and 200 full grown young were taken each year around 1782.

Only the full grown young are now taken while those that still have some down are left on their nests. During the last 15 years the catch of young gannets has been from 317 to 670 (Fig. 1).

Although the gannet colony has been culled for centuries and about 500 young and 200 adults were taken each year the population has been slightly increasing during the last hundred years (Olsen & Permin 1974, Nelson 2002). Taking such a large portion of the production without diminishing the population indicates immigration from surrounding colonies.

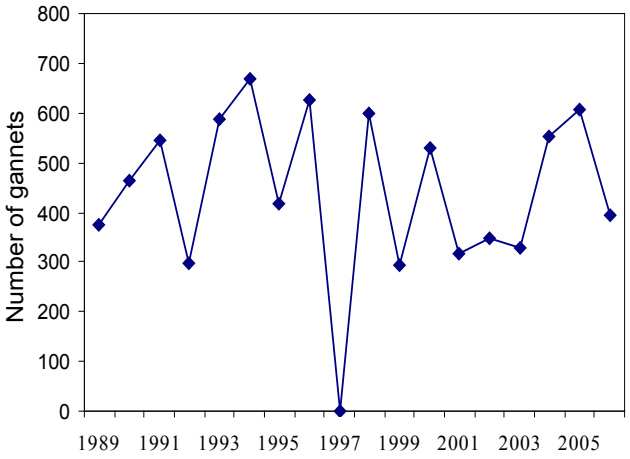

Figure 1. The number of young gannets taken on Mykineshólmur and Flatidrangur. In 1997 there was no hunting.

Shag

Shags are hunted with guns and the harvest is estimated to be in the order of 500 to 1,500. The hunting pressure appears to have been to high, so the hunting season has now been mowed into the winter to reduce the hunting possibility.

Gulls

In a few places immature gulls used to be shot from hides on land as they were flying along the coast. These were especially great black-backed gulls, lesser black-backed gulls, herring gulls and also glaucous gulls. During the last decades this hunting method has become more rare and the harvest is estimated to be in the order of 100 to 500 birds each year.

Black-legged kittiwake

There has been a decline in the kittiwake population for decades, but this is not due to hunting. Adult kittiwakes used to be shot and chicks were taken on the nest, but during the last 50 years or so kittiwakes have not been hunted. Occasionally fisherman, however, may take some kittiwakes for food onboard.

Common murres

Since 1980 murres have been protected in summer but before that, murres were very much sought after. Adult birds were taken in the colony with the fleygastong, either in the cliffs or from boats on the sea below the cliffs and even driven on land. Birds floating on the sea were also trapped from floating rafts provided with nooses. A high number of murres were also shot in the summer. The average catch in the 19th century was estimated at about 55,000 murres each year, but the maximum for the biggest murre colony, Skúvoy, was about 70.000 around 1920 (Nørrevang 1977).

Due to the decline in the murre population since late in the 1950s all murre fowling has been banned in the summer since 1980. However, it is still allowed to shoot murres in winter. The harvest is much influenced by the weather and it is estimated to be in the order of 1,000 to 10,000 each year. Most of these birds come from Iceland and Scotland (Olsen et. al 2000).

The main reason for the fluctuation in the murre population during the last decades seams to be due to fluctuation in the productivity in Faroese waters (Olsen 1992, Gaard et.al 2002).

Razorbill

The population of razorbill, which is only a few percent of the murre population, appears to have declined in the same order as the murre. When fowling, the razorbills have been treated in the same way as guillemots, and so also in the hunting legislation. In the winter razorbills, mainly from Iceland (Olsen et. al 2000), occur in Faroese waters and the harvest is in the same order as for guillemots.

Bergur Olsen: *Plucking of a newly fledged Fulmar.*

Puffin

The fowling of puffins nowadays starts in the beginning of July, and the fowling goes on as long as there are puffins in the colonies, usually until the end of July or the first two weeks of August. The puffins are fowled with the traditional fleygastong. With this method mainly immature puffins are taken as they make up the main part of the wheel of birds flying in the colony. Breeding birds normally fly directly to and from the nest borrows and are therefore not as exposed. Food carrying birds are not taken and if they accidentally are taken, they are set free again. The method is in a way self regulating as the immature birds tend to spend less time on land in years with low food productivity, and thus the catches are low these years (Fig. 2). The total catch is very variable from about

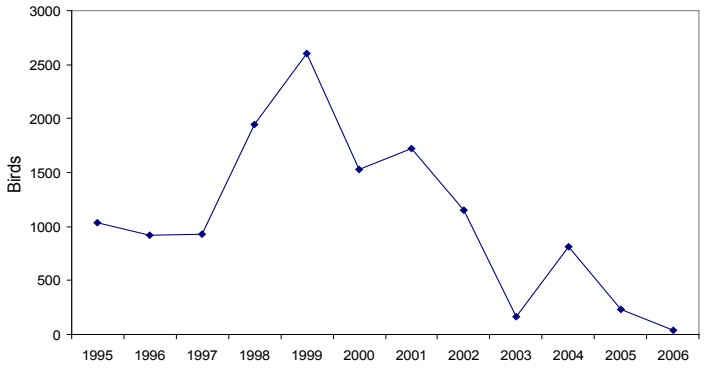

Figure 2. Number of puffins fowled on Skúvoy, Only the "landpart" whish is 1/3 of the catch is shown in the figure.

10,000 to 100,000 each year. About 10% of these birds are from Iceland (Olsen et. al 2000).

Taking adult puffins from their burrows was banned in 1954. By license it can still be done in a few places and the catch has been around 1,000 birds, but no license have been given since 2003. In one place, Sumba, there is a tradition to take about 1,000 puffin chicks on two stacks just before they leave first in August. This method can only be used when the production of young is high, and therefore the youngs have not been harvested the last tree years.

Puffins are shot in winter, and the harvest is in the order of 1.000 to 5.000. These birds are mainly from Norway (Jensen 1986, Olsen et. al 2000). The puffin population has declined during the last 100 years, partly due to introduction of the brown rat, but also on rat free islands there has been a decline. The main reason for the fluctuation during the last decades seams to be due to fluctuation in the productivity in

4. International matters

The seabirds hunted in the Faroes are mainly from the Faroese colonies, but ringing results (Olsen et. al 2000) showed that birds from Iceland, Scotland and Norway are also feeding in Faroese waters, especially in the winter. In summer about 10% of the puffins fowled in the colonies are from Iceland, while the puffins that are shot in winter are from Norway. The razorbills that are shot in winter are mainly from Iceland while the murress are from Iceland and Scotland in equal proportion.

5. Cultural and economic significance of the harvest

Subsistence exploitation of seabirds for food was a normal part of the way of life in the Faroes, and so it still is for many people, especially those living on the small isolated islands. This has given rise to strong cultural traditions, but the economic significance of the harvest is now of less importance. Relatively many people are still interested in hunting, and as it is now, it does not affect any population seriously, so hunting will probably continue for many years to come.

10. Outreach programmes

The hunting legislation from 1954 is well known and the fowlers accept the legislation. It was first printed separately in 1974 (Dam 1974). It is also printed with

updates each year in the annual Faroese Almanac (Isholm 2007) and the annual Ship List (Olsen and Olsen 2007). The dates for the hunting season is also printed in many of the small local calendars.

6. Management recommendations

A reliable hunting statistic would give a better possibility to regulate the hunting in a sustainable way. Hunting license and reporting could be demanded from those using gun, but as most of the birds are fowled without the use of guns the management has to take this into account. The fulmars, which are the most important fowl, can be taken on the sea by all having a boat, and getting their harvest demand an extensive management. On land, however, it is only the landowners that may fowl, so it should be possible to get the harvest of puffins and manx shearwaters from the owners of each colony.

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Seabird Harvest in Finland

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1. Introduction

Of seabirds, only certain seaducks are harvested in Finland. There is no tradition in hunting auks (murres, razorbills, guillemots), gulls, terns, jaegers, loons, grebes, and shorebirds. However, herring gulls and great black-backed gulls are being decimated as pest species outside the breeding season. The Hunting Act states all the species that are game species or unprotected species (like gulls), which may be hunted.

Hunting is the only taking of seabirds in Finland. Only shooting is allowed (no trapping), and nests and chicks are always protected. Egging has been banned since 1962. Formerly, egging played an important role in the household economies in remote archipelago areas. Yet, it badly decimated the breeding populations of many seabirds, notably eiders and auks. As a capital breeder, the common eider is especially unsuitable for egg pulling (t & Selin 1984). Collecting eider down is still continuing in small scale. Down collecting is permitted only when the incubation period of eiders is over. Legally, down collecting is comparable with berry picking, allowed to everyone also on private land (based on the Public Rights of Access, common for all Nordic counties). The income is not taxable. The annual timing and certain procedures in down collecting are ruled by the down industry.

The hunting authority in the mainland of Finland is the Ministry of Agriculture and Forestry (Department of Fisheries and Game). The equivalent authority in the Åland Islands is the Government of Åland. The Åland Islands form an autonomous region in the southwest archipelago and has its own hunting act. If not otherwise stated, the following information on hunting practices applies to mainland Finland.

2. Harvest regulations and harvest survey methods

The Hunting Act, statutes, decrees, regulations and directions regulate hunting. In addition, there are sections in the legislation on nature conservation and animal protection and other relevant sections in the Penal Code and Firearms Code connected with hunting. Several restrictions in hunting techniques

J. Moliis: *Sun drying of down in the Åland Islands in the 1930s*

are set in the Hunting Act, aiming to protect waterfowl from over-shooting or to increase the sporting character of hunting (see e.g. Lampio 1974). The hunting organization includes the statutory Hunters' Central Organization and fifteen game management districts, which together organize hunting practices and see to it that hunting complies with the principle of sustainable use of game animals. Game management district have several game management associations, which arrange hunters' examinations and statutory shooting tests.

Every person intending to become a hunter must pass the hunting examination. The examination has been obligatory since 1964. After passing the examination, he/she has to pay the annual game management fee. Through the fee (to the state) every hunter becomes automatically member of the game management association of his/her home municipality. The Hunters' Central Organization maintains a register of all hunters. The game management fee is valid for one hunting year, which begins August 1 and ends July 31 of the following calendar year. Persons, who have not paid for the fee during the last five years, are deleted from the register. To become a hunter again, he/she must pass the hunting examination once again.

During the last 25 years, the number of hunters has stayed at about 300,000. This makes 6% of the total population, a larger proportion than anywhere else in Europe. About 70% of hunters are wildfowlers. However, majority of them are hunting on the inland water bodies (lakes number 187,888); only about 15,000 are genuine seaduck hunters. Shooting rights are bound to land ownership. However, one can lease shooting rights from a landowner. An exception is made by some state-owned archipelago areas, where every licensed hunter can bag wildfowl.

The annual game bag statistics is compiled by the Finnish Game and Fisheries Research Institute. The statistics present the game bag nationwide as well as by game management district or by subarea (the northernmost vast game management districts are divided into smaller subareas). In addition to the bagged game, the statistics provide an estimate of its monetary value and the quantity of meat in the annual bag, as well as of the size of the bag that hunters bag outside their own game management district.

The data are acquired by means of a sampling study. A questionnaire is sent to c. 5000 systematically sampled hunters. The sampling ratio of recipients accords to the number of hunters in each game management district or subarea (c. 300 sampled from each). The data are analysed with a SAS program for specific application.

Thanks to the fairly high response percentage (invariably over 80%), the reliability of the estimated game bag at the national level is fairly good. Bag reporting is voluntary, not obligated e.g. in order to get the license renewed. The Finnish Game and Fisheries Research Institute has compiled the annual bag statistics since the beginning of the 1970s. Over the years, the content of the annual statistics has

J. Moliis: *Searching for eider nests in the Åland Islands in the 1930s.*

expanded, the sampling methods have evolved, and statistical calculations have developed so as to better comply with current demands. Bag statistics are published in international and national publications of statistics (e.g. in the Yearbook of the Nordic statistics), and are also presented over the Internet, at the website http//www.riistaweb.riista.fi.

3. Locations, species and numbers harvested

Potentially, hunting occurs throughout the archipelago (which on the Finnish side comprise 73,000 islands of >5 ares in size) along the entire coastline (4,600 km long), with the exception of bird sanctuaries and national parks. However, game belongs to the landowner and most of the archipelago is private land. Non-hunting landowners or administrators commonly prohibit hunting in their property. As all shooting is land-based (using decoys; hunting from motor-boat with the engine running is prohibited) there are always large hunting-free areas in addition to the sanctuaries serving as refuges. In the Åland Islands, there are 6,500 islands with a total land area c. 1,500 km^2. Of the 26,500 inhabitants (Swedish-speaking, yet non-natives) c. 3,700 are hunters (14%). Hunting seaducks is very popular in the Åland Islands. The bags of other waterfowl (dabblers, geese etc.) represent only 15% of those of seaducks.

In mainland Finland, four species of seaducks have an open season. Open season for male eider spans 1 June - 31 December, for female eider 20 August - 31 December, for oldsquaws and mergansers (common and red-breasted) 10 September - 31 December. In the Åland Islands, hunting season in autumn spans 1 September - 31 December for the seaducks mentioned above except for eider female, which is totally protected. In addition, white-winged scoter belongs to the open-season species, and spring shoot of the oldsquaw is still allowed (bag size was 1,400 in 2006). Oldsquaw is a transient migrant and has no permanent breeding population in the Finnish archipelago (but some 3,500 pairs are breeding in northernmost Lapland). The harvested population consists of migrants from northern. The other seaduck species have local breeding populations

In mainland Finland, the mean annual bag of all waterfowl in 2000-2004 was 599,000 birds. Of these, 31,000 were seaducks (5%). There is a decreasing trend in bag sizes that has continued since mid-1990s. In 2005, 6,300 common eiders, 8,000 oldsquaws, 3,700 goosanders, and 1,400 red-breasted mergansers were bagged in mainland Finland, totalling 19,400 (a 37% reduction from the mean bag in 2000-04).

The bags of the common eider paralleled with the species' population trend over the entire Finnish coast. The bags were increasing during the late 1980s, and peaked in 1993, at roughly the same time when the core population in SW Archipelago reached its peak. After that, a continuous decline took place both in bag size and in the population size.

4. International matters

When entering the European Union (1996) Finland had to harmonize its hunting policies with the ecosystem-based EU Habitat Directive and Birds Directive and the Natura 2000 Network. A necessary prerequisite for sound harmonizing was cessation of the spring hunt of seaduck drakes. This finally happened in 2006, after European Commission had sued Finland (inc. the Åland Islands) in European Court for braking against the Birds Directive Articla 9. The Commission felt the mortality in male-only harvest was additive (based on Hario *et al.* 2002), and that the bags were too large, and that bagging seaducks is equally possible in autumn (based on Tiainen *et al.* 2001); it is not a necessity to bag during the reproduction period.

All seaducks in Finland are strictly migratory, and many eiders leave for the moulting and wintering areas already before the open season sets in, especially the males. When the spring hunt is not anymore allowed, hunters consider that a disproportionately large part of the population will be bagged outside Finland, notably on the wintering grounds in Denmark. Furthermore, as males disappear early, the female-biased Finnish bagging may truncate the sex ratio of the population.

However, the current Finnish eider bags are too small to truncate the sex ratio of the entire Baltic population. No effect of it was seen during the era of spring shoot either, when males made 70% of the total of 25,000 – 27,000 eiders shot in those days annually. The current bag of eiders is 6,300. No female-biased sex ratio resulted; on the contrary, there are indications

of a gradually increasing male-biased sex ratio in the Danish wing sample data during 1982-2004 (T. K. Christensen in litt.).

Finnish eider bag size correlated with the local population changes up to 1982, whereas the Danish hunting did not utilise the increasing shooting opportunities (i.e. the 10% annual increase in eider populations in the Baltic Sea)(Hario & Selin 1987, Noer *et al.* 1995). This contributed to the tremendous increase of eider populations in the whole of Baltic Sea in 1970-85. The 130,000 - 140,000 birds taken annually in Denmark in the 1970s and 1980s were estimated to comprise 6.5-9.5% of the total wintering stock there (Noer *et al.* 1995). In Denmark, bagging increased till 1983, thereafter stagnating, and now the bags are in decline due to fewer hunters (Christensen 2005). Danish harvesting thus removed a smaller rather than a larger share of the Finnish eider densities and is presently paralleling the population decrease.

5. Cultural and economic significance of the harvest

Several studies exist on the socio-economical aspects of hunting in the archipelago (e.g. Storå 1968). Harvesting eggs formerly made an essential part of the exploitation of seabirds in the Finnish archipelago. It probably had severe negative effects on the eider population size because eiders seem to be less suitable for egging than most other Anatidae (see Hario & Selin 1984)

Today, there is practically no commercial value in seabird hunting. Selling harvested birds is allowed but it is not a common practice. However, an imaginary value of the quarry can be calculated, based on the quantity of game meat derived from mean quarry size. The value of bagged seaducks, about 120,000 euros, comprise only 2.3% of the total value of all wildfowl. As most game meat in Finland is from moose and other mammals (ungulates and lagomorphs) the calculations based on kilograms don't give very high value for bagged game birds despite the high number of bagged individuals.

Eider down collecting is a small-scale industry. There is only one private company buying down in Finland. All eider down is exported. Annually 10-20 collectors provide 400-500 kg down (getting 150 euros/kg).

6. Outreach programs

There are currently no public outreach programs aimed at seabird harvesting.

7. Management recommendations

Though the present bags of seaducks cannot be considered too large, the situation may be changing due to the increasing level of eutrophication in the Baltic Sea, which can gradually reduce the recruiting stocks of seaducks due to adverse changes in birds' feeding ecology. What we need now is a follow-up study on factors causing variations in recruitment rates of game species in marine environment. This

T. Lampio: ***Landbased sea duck hunting in Finland,*** **Åland Islands**

issue was put up as the first recommendation for management work in the previous hunting report of CAFF (Technical Report No. 9). Recently, it has been addressed in studies on population dynamics in common eiders from the Gulf of Finland. The other recommendation, “conduct hunting studies” has been fulfilled for the spring harvest issue, but needs further activities in examining the role of hunting mortality as the population limiting/regulating factor of seabirds. A closer co-work with seaduck specialists in Denmark and other Baltic countries is desirable. So, both recommendations of the previous report are still valid.

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Seabird Harvest in Greenland

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1. Introduction

Greenland has a long tradition for seabird harvest dating back hundreds of years. In the small and often isolated coastal settlements, seabirds were harvested as a necessary food supply or for their down or skins. Today seabirds still play a key role in Greenland subsistence hunting and growths of the human population, better guns, and faster boats have increased the harvest for several species during the last hundred years.

Regulations of the seabird harvest in Greenland were gradually implemented during the 20th century and recently (2002 - 2004) the legislation was subject to a major revision. Some seabird species were recognized as declining and bag statistics witnessed about high harvest levels, which appeared to be a contributing factor for the declines (Kampp *et al.* 1994; Merkel 2004a).

Records of historical harvest levels are available only from the purchase of downs or skin products (Vibe 1967), but in 1993 a nationwide bag recording system (Piniarneq) was introduced in Greenland. This program collects information of monthly bag numbers by means of hunters report. Harvest statistics from Piniarneq have been available since 1993 and indicate large changes in the harvest since the introduction of the revised legislation.

The following pages represent an updated and revised version of the chapter about seabird harvest in Greenland published in CAFF Technical Report No.

C. Egevang/ARC-PIC.com: ***Murre harvest in Nuuk*, West Greenland**

9 about Circumpolar seabird harvest (Denlinger and Wohl 2001).

2. Harvest regulations and harvest survey methods

Harvest regulation

Up to 1978, hunting regulations were chiefly the responsibility of local authorities. Several local and single-species legislations were introduced, but most bird species did not have a closed season. The first governmental act on bird protection came in 1978 and covered most of West Greenland. This was replaced by an executive order in 1988, covering all of Greenland. In the first act 30 species had an open season, usually from 16 Aug. to 14 Jun., but in 1988 this list was shortened by seven species and several other species had the closed season prolonged with two weeks or more. Except for a minor revision of the executive order in 1989 this legislation remained unchanged until 2002 – 2004, when the present regulations were introduced. With these changes most species had the open season shortened by one to three moths, mainly during spring and early breeding. For a detailed description of the hunting regulations applying up to 2002 see Christensen (2001) and Lyngs (2003).

Today, the harvest is still regulated by open and closed seasons, but daily quotas now apply for some

Table 1. Hunting regulations for birds in Greenland. Species not mentioned are protected all year. In addition, all hunting is forbidden in the National Park of East Greenland and in Melville Bay Nature Park in Northwest Greenland.

Species English name	Species Latin name	Area	Open season
Common loon	*Gavia immer*	All Greenland	1 Sep. – 31 Dec.
Northern fulmar	*Fulmarus glacialis*	All Greenland	1 Sep. – 31 May
Great cormorant	*Phalacrocorax carbo*	All Greenland	1 Sep. – 31 Mar.
Greater white-fronted goose	*Anser albifrons*	All Greenland	1 Sep. – 15 Oct.
Pink-footed goose	*Anser brachyrhynchus*	Ittoqqortoormiit	1 Sep. – 30 Apr.
		Rest of Greenland	1 Sep. – 31 May
Barnacle goose	*Branta leucopsis*	Ittoqqortoormiit	1 Sep. – 30 Apr.
		All Greenland	1 Sep. – 31 May
Canada goose	*Branta canadensis*	All Greenland	1 Sep. – 15 Oct.
Mallard	*Anas platyrhynchos*	All Greenland	1 Sep. – 28 Feb.
Oldsquaw (long-tailed duck)	*Clangula hyemalis*	All Greenland	1 Sep. – 28 Feb.
Common eider	**Somateria mollissima*	Ittoqqortoormiit	15 Oct. – 31 May
		Qaanaaq	15 Oct. – 15 Jun.
		Rest of Greenland	15 Oct. – 28 Feb.
King eider	**Somateria spectabilis*	As common eider	As common eider
Rock ptarmigan (Grouse)	*Lagopus mutus*	All Greenland	1 Sep. – 30 Apr.
Great black-backed gull	*Larus marinus*	All Greenland	1 Sep. – 30 Apr.
Glaucous gull	*Larus hyperboreus*	All Greenland	1 Sep. – 30 Apr.
Iceland gull	*Larus glaucoides*	All Greenland	1 Sep. – 30 Apr.
Black-legged kittiwake	*Rissa tridactyla*	All Greenland	1 Sep. – 28 Feb.
Dovekie (little auk)	*Alle alle*	Ittoqqortoormiit and Qaanaaq	All year
		Rest of Greenland	1 Sep. – 30 Apr.
Thick-billed murre (Brünnichs guillemot)	**Uria lomvia*	From Kap Farvel to Kangaatsiaq	15 Oct. – 28 Feb.
		North of Kangatsiaq and East Greenland (except Qaanaaq and Ittoqqortoormiit)	1 Sep. – 28 Feb.
		Ittoqqortoormiit	1 Sep. – 31 May
		Qaanaaq	1 Sep. – 15 June
Common murre (common guillemot)	**Uria aalge*	As thick-billed murre	As thick-billed murr
Black guillemot	*Cepphus grylle*	All Greenland	1 Sep. – 28 Feb.
Common raven	*Corvus corax*	All Greenland	1 Sep. – 28 Feb.

* Daily quota: Commercial hunters, 30 birds; recreational hunters, 5 birds; spring harvest (after 1 Mar) quota always 5 birds

species. In general, the birds are now protected in the spring and during the breeding season, usually from the beginning of March or May until the end of August or mid October (Tab. 1). For a few species this is not the case in North and East Greenland where the human population is sparse and where birds normally are present only during the breeding season. This concerns dovekie, which can be hunted year around in Ittoqqortoormiit and Qaanaaq and it concerns the eiders and the murres, for which the open season extends to 31 May (Ittoqqortoormiit) or 15 Jun. (Qaanaaq) (Tab. 1). For murres and eiders there is a daily quota of 30 birds for commercial hunters and five birds for recreational hunters. In those areas where hunting is allowed in the spring, the daily quota is always five birds.

A no-disturbance zone of 5 km applies to all murre colonies in Greenland, where shooting and noisy behaviour is prohibited. Further, some seabird colonies are designated as protected areas where all access is prohibited.

There is a ban on egg collection, but for dovekie egging is allowed throughout the breeding season in Ittoqqortoormiit and Qaanaaq. For personal consumption egging is also allowed until 31 May for northern fulmar, glaucous gull and great black-backed gull. In addition, commercial hunters are allowed to sell these eggs at the local market until 31 May. Prior to 2002 egging was also allowed on parasitic jaegers, arctic terns, great black-bagged gulls, Iceland gulls, black-legged kittiwakes and black guillemots until 1 July.

The distinction between commercial hunters and recreational hunters relates to the income from the harvest. Persons whose primary income (> 50%) is from hunting and fishing can apply for a commercial hunting license. Recreational hunting is open to all Greenlanders, as long as they register with the local municipality and pay a small fee of ca. $10 US to get a hunting license issued. No hunting examination is required. Equal rights apply to persons with citizenship in another country after two years of residence in Greenland. Commercial hunters are allowed to sell their harvest at the local outdoor market called brættet.

Table 2. Greenland seabird harvest statistics (Piniameq) for the period 1993 - 2006 (The Greenland Home Rule, Dept. of Hunting and Fisheries). Several species were not included in Piniarneq until 2002 (blank cells)

Species	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2004	2006
C. loon										129	213	203	208	194
N. fulmar										46	942	860	750	1521
Eggs										0	59	95	34	6
G. cormorant										211	695	420	506	682
Goose sp.	1652	2017	1717	1171	1082	529	661	724	1226	452	448	377	361	270
Mallard										258	350	373	301	335
Oldsquaw									5	371	862	656	534	576
C. eider	82835	75635	65914	83535	76985	72109	71041	61716	52253	19788	21788	18376	20953	23542
Bycatch										34	896	1314	2247	3806
K. eider	4776	5322	4018	5555	4030	3362	3535	2684	7528	7132	6096	5816	4950	4440
Bycatch										20	104	401	763	444
GBB gull										69	296	275	207	1007
Eggs										66	1869	2168	2124	3439
Glaucous gull										65	195	413	474	804
Eggs										0	408	683	948	980
BL kittiwake	63107	52256	58087	55718	53086	43713	44954	34073	32873	11612	16157	8353	8851	7967
Dovekie	104478	61643	60626	64486	49220	21017	25296	44871	54832	43816	28003	14408	21340	24814
Eggs										0	180	220	528	2157
Murres	197352	187645	201651	254694	236364	221721	227121	177002	142481	117686	97409	82821	84690	80155
Bycatch										14	362	1802	1132	316
B. guillemot	10347	35036	28172	32839	30473	30517	27603	26524	24544	18369	18187	16383	16327	14858

Harvest survey methods

Harvest statistics have been compiled systematically since 1993 and is referred to as the Piniarneq system. A hunting license is renewed only if the request for an annual harvest report has been met. If a hunter fails to send in the report he has to re-register with the municipality. The hunting statistics quantify the taking of birds (and mammals) on a monthly basis and since 2002 also accidental bycatch of seabirds in fishing gear and harvested eggs are included in Piniarneq (Tab. 2).

The reliability of the harvest statistics has only been validated sporadically. It is generally assumed that the figures reported add up to only a minimum of the total harvest, and as such represents an index rather than the total number of birds harvested. In the late 1980s Falk and Durinck (1992) roughly estimated the total annual harvest of murres to 280,000 – 390,000 birds, while the total numbers reported to Piniarneq in the 1990s were between 190,000 and 250,000 birds (Tab. 2). This difference cold be explained by reasons other than underreporting in the 1990s, but inconsistencies found in a local study in Nuuk, Southwest Greenland, indicate more directly that not all bags were reported. Based on murres available at the local outdoor market Frich (1997b) found that only 43% of the murres available were reported to Piniarneq. In contrast, Frich and Falk (1997) could not detect any major discrepancy between the eiders available at the market in Nuuk and the numbers reported to Piniarneq. Based on a similar study at the local market in Nuuk a few years later the same conclusion was reached except for the months March and April (Merkel 2004b). In this period the level of bycatch from lumpsucker gillnets was high and indicate that these birds were not reported to Piniarneq.

A consistent factor of unreliability in the harvests statistics concerns the ratio between king eiders and common eiders. Based on the surveys at the local market in Nuuk it has been shown that hunters rarely discriminate between these two species. King eiders made up between 22% and 28% at the market, but only between 2% and 6% was reported to Piniarneq (Frich and Falk 1997; Merkel 2004b). Neither do hunters discriminate between thick-billed murres and common murres, but since common murres are rare in West Greenland this source of error becomes insignificant. Frich (1997a) found the only 0.1% of the murres made available at the market in Nuuk during the 1995/96 hunting season were common murres.

3. Locations, species and numbers harvested

The majority of the seabirds harvested in Greenland are bagged during winter in Southwest Greenland. The coastal and offshore waters of Southwest Greenland are internationally important winter quarters for seabirds and it is crudely estimated that a minimum of 3.5 million seabirds use this region in winter (Boertmann *et al.* 2004). Birds are mainly from Arctic Canada, Greenland and Svalbard, with smaller numbers also from Alaska, Iceland, mainland Norway and Russia. The most numerous species are common eider, king eider, thick-billed murre and dovekie (Boertmann *et al.* 2004).

The thick-billed murre is the most important species harvested with 80,155–254,694 birds reported yearly to Piniarneq in the period 1993-2006 (Tab. 2). Approximately 80% of these are bagged in Southwest

C. Egevang/ARC-PIC.com: ***Black-legged kittiwakes at the local market in Nuuk,*** **Greenland.**

Greenland during the winter season. Birds originate in breeding areas in Norway, Russia, Iceland, Arctic Canada and Northwest Greenland (Kampp 1988; Lyngs 2003). Eiders account for the second most important seabird resource, with yearly numbers between 24,192-89,364 reported in 1993-2006 (Tab. 2, common and king eider combined). For both eider species the majority of the winter population breeds in tt Canada and a small proportion in Northwest Greenland (Lyngs 2003).

The effect on population stability of the quantitatively large winter harvest in Southwest Greenland is diminished because many of the birds harvested are juvenile birds (except for the spring harvest; allowed until 2002) (Frich and Falk 1997; Merkel 2004b). In contrast, the harvest in Northwest Greenland, although relatively small, is considered relatively more harmful to the population because this is the main breeding area and primarily breeding birds or prospecting sub-adults are present here (Falk and Durinck 1992; Lyngs 2003).

By number, back-legged kittiwakes and dovekies also constitute important harvest sources in Greenland with up to 100,000 and 60,000 birds reported in the 1990ties (Tab. 2). As with the murres and eiders, most kittiwakes are bagged in Southwest Greenland. The harvest peaks during autumn when there is a congregation of birds from Greenlandic and European populations (Lyngs 2003). In contrast, nearly all dovekies are harvested in the breeding colonies in Northwest Greenland. The population impact of the dovekie harvest is considered negligible due to a huge breeding population, estimated to count at least 33 million pairs (Egevang *et al.* 2003). common loon, northern fulmar, great cormorant, mallard, oldsquaw, great black-bagged gull and glaucous gull were not included in Piniarneq until 2002. They are all harvested in small numbers (Tab. 2).

Based on the figures from Piniarneq (Tab. 2), the harvest of thick-billed murres, common eiders and black-legged kittiwake has declined considerably during the last decade. A markedly drop occurred in 2002 when the new hunting regulations were introduced, however, there was a tendency for a gradual decline in the years before 2002. It is not clear whether the decline in the reported harvest fully reflects a corresponding decline in the actual number of birds being killed, but the development corresponds with a gradual reduction in the number of commercial hunters; from 4,068 licences in 1993 to 2,870 in 2002 (Piniarneq 2005).

4. International matters

Given the fact that Greenland waters constitute international important winter quarters for seabirds from several arctic countries the harvest management in Greenland is a matter of international importance (Boertmann *et al.* 2004; Boertmann *et al.* 2006).

Joint efforts between Canada and Greenland have successfully improved the management basis for their shared population of common eiders (Gilchrist and Mc Cormick 2001; Gilchrist *et al.* 2001). To a large extent this work is responsible for the recent change in the Greenland hunting regulations. In the process of evaluating the sustainability of the common eider harvest in Canada and Greenland major gaps of knowledge were addressed; the link between breeding areas and wintering areas was studied by satellite telemetry (Mosbech *et al.* 2006; Merkel *et al.* 2006) and various population estimates were refined (Merkel *et al.* 2002; Merkel 2004a; Gilliland *et al.* submitted) . The Circumpolar Eider Conservation Strategy and Action Plan produced by the CBird expert group under CAFF was important for the initiation of the Canadian/Greenlandic joint effort (CAFF 1997).

There is a need for similar joint efforts in the management of other seabirds in the Arctic; one obvious species being the thick-billed murre, for which the winter harvest in Greenland targets breeding populations in Canada, Iceland, Norway and Russia. The harvest management in Greenland also needs to take into consideration that the Greenland breeding population is also harvested in Newfoundland waters during winter (Lyngs 2003). Already in 1996 the CBird group published a Circumpolar Murre Conservation Strategy and Action Plan (CAFF 1996), but in terms of management the implementation has been difficult due to the rather complex migration patterns of the thick-billed murre. However, a harvest impact population model is under development (G. Robertson, pers. comm.).

F. Merkel: *Common eider breeding in West Greenland.*

F. Merkel: *Glaucous gull, Upernavik*, West Greenland.

5. Cultural and economic significance of the harvest

Permissions for commercial productions of murres in settlements and small towns in South Greenland were previously grated by the Home Rule Government on a regular basis. The murres were sold to processing companies and meant only for the national market. No export took place. Before the 1988 executive order the number of birds processed could be as high as 93,000 (Falk and Durinck 1992), but subsequently the quota was reduced to 25,000 per year (18,227 birds processed, on average) (Frich 1997a). Since 1995 permission for commercial production has not been granted.

The harvests of seabird eggs (primarily common eiders, thick-billed murre and arctic tern) use to be of great cultural significance in Northwest Greenland. Bistrup (1925) describes how residents of northern communities use to spend the summer at remote seabird island with eggs as one of their prime food sources. Salomonsen (1967) estimated that around 60,000 eider eggs were collected annually in the beginning of the 20th century. With the executive order of 1988 all egging was banned in Greenland (three species now exempted, see above) and eggs are no longer to any significant subsistence value. However, according to local knowledge the tradition is occasionally still practised. Breeding ground surveys of eiders colonies conducted in 1998-2001 indicated that illegal egging was still a problem in some areas of Northwest Greenland (Merkel 2004a). This appeared also to be the case with illegal hunting of murres in the breeding season (Merkel *et al.* 1999).

Collection of eider downs were of great cultural and economical importance in West Greenland throughout most of the 19th century, with a peak of intensity early in the century (Vibe 1967). Also the skins were important for clothing and for traditional wall hangings (Müller 1906). Wall hangings are still produced today, but in small numbers. It appears that this old craft is slowly dying out.

6. Outreach programmes

Programs to reduce seabird harvesting in Greenland have primarily been aimed at illegal hunting and unsustainable harvest. During the late 1980s a World Wildlife Fund (WWF) campaign was directed towards hunters in southern Upernavik where illegal and widespread hunting was thought to be a factor contributing to local population declines of thick-billed murres. Communication and consultations between scientists and hunters were an essential part of the program. A poster and a movie describing the problems were created.

In 1998-2000, the responsible department in the Home Rule Authority and the Greenland Institute of Natural Resources repeated a similar campaign aimed at central west Greenland, including the Upernavik district. In addition to communication and consultations general newspaper articles and radio talks on illegal hunting, general biology and biologist's work were produced. A major seminar on "Living resources" was held in Nuuk, 1999, at which politicians, hunters` organisations, fishermen, biologists and managers attended to discuss the current use of living resources in Greenland and the future management (Rydahl and Egede 1999).

A nationwide information campaign (Tulugaq) concerning sustainable use of wildlife was initiated in spring 2002 and continued for the following two years. The purpose of this campaign was to disseminate information to the public about the implications of not using wildlife in a sustainable way. Special emphasis was put on so-called "problem species" which among seabirds included thick-billed murre, common eider,

king eiders and arctic tern (www.nanoq.gl/tulugaq). The campaign comprised public information meetings, meetings with relevant organizations and meetings with politicians in the most relevant municipalities of the country. Furthermore, monthly TV-and radio-programmes highlighted the main problems about population declines and the urgent need for sustainable use to the public.

Several small articles about common eiders and king eiders were distributed door-to-door in Greenland in 2005 through PITU – a semi-annual newsletter from the Greenland Institute of Natural Resources. The articles included information on how to tell apart common eiders and king eiders.

From the most recent information campaign (Tulugaq) the general impression was that people were less hostile towards managers and researches and more co-operative with respect to sustainable harvest principles. Apart from this there is limited information on the success of the outreach programmes. One exception is from an ongoing breeding ground survey of common eiders in Northwest Greenland, which indicates that illegal egging has now decreased to insignificant levels (Merkel 2008).

7. Management recommendations

Progress for the 1999 management recommendations (Christensen 2001):

- Gather information from hunters concerning their knowledge of the relationship between human needs and use of seabirds, especially of murres and eiders.

A major seminar on “Living resources” was held in Nuuk, 1999, at which politicians, hunters` organisations, fishermen, biologists and managers attended to discuss the current use of living resources in Greenland and the future management (Rydahl and Egede 1999). Researchers continue to arrange public meetings in connection with field studies.

- Build mutual respect and two-way communication between resource managers and hunters by creating programs like the one started in Upernavik.

The outreach program in Upernavik was continued and a larger nationwide campaign was carried out in 2002-2004, cf. section 2.4.6.

- Use local knowledge to a greater extent in both scientific and administrative work.

Local knowledge has been collected for several seabird species in Greenland since 1999; sometimes following a standardized protocol and sometimes more sporadically. For the thick-billed murres and common eiders some of this information has been published (Merkel 2004a; Gilchrist *et al.* 2005). Local hunters are now involved in monitoring programs for eiders and for murres (Merkel and Nielsen 2002, F. Merkel, unpubl.).

A formal agreement of cooperation between the Greenland Institute of Natural Resources and the Greenland Hunters Organization was signed in 2005. This agreement obligates each party, in advance of field studies, to exchange knowledge about study species and study areas. The institute is obligated to consult local users for advice on logistics and study periods.

- Create a new executive order concerning bird protection that would be more inclusive and would protect areas of importance for breeding, moulting, and over-wintering birds.

A new executive order on bird protection was implemented in 2002-2004. Management recommendations had strongly advised to reduce the overall harvest levels and to avoid spring harvest. Modelling exercises indicated that the harvest level of common eider was not sustainable and furthermore showed that the spring take had the greatest negative impact on population stability (Gilchrist *et al.* 2001; Merkel 2004b). For both common eider and thick-billed murre, declining breeding populations have been linked to over-harvesting (Krabbe 1907; Bistrup 1925; Kampp *et al.* 1994; Merkel 2004a; Burnham W. *et al.* 2005). With few exceptions the spring hunting is now closed and for the most important species it appears that harvest levels have decreased dramatically since 2002 (Tab. 2).

New management recommendations:

- Conduct frequent monitoring of breeding populations among the more intensively hunted species to examine if populations show signs of recovery as a consequence of the changes in

harvest pressure.

For common eiders this recommendation has already been implemented for one region in Northwest Greenland. In cooperation with local residents the breeding population has been surveyed every year since 2001. A gradual increase in breeding numbers has been detected since 2002 (Merkel 2008).

- Carry out a thorough validation of the harvest statistics; does the large drop in reported numbers reflect a true reduction in the number of birds taken or has new bias been introduced as a consequence of the recent changes in regulations?
- Review the sustainability of the common eider harvest in Canada and Greenland based on updated harvest estimates from Greenland, and consider if further adjustments to hunting restrictions as needed.
- Support and contribute to work in CBird concerning the development of a harvest impact model for the thick-billed murre.
- Quantify the magnitude of eiders caught as bycatch in lumpsucker gillnets during spring in West Greenland.

  This has earlier been shown to be of management concern for common eiders in the Nuuk area, when studied in 2000 and 2001 (Merkel 2004b). It is no longer legal to sell bycatch at the local market and the magnitude of the problem is therefore not easily surveyed anymore. Instead, fishermen are obligated to report the bycatch as harvest to Piniarneq, but it is known from various sources that many fishermen are reluctant to do so.
- Based on information on seabird distribution and human disturbances designate marine sensitive areas as protected areas with no-go status or limited access.

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Seabird Harvest in Iceland

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1. Introduction

Harvesting has been one of the many conservation issues of the Circumpolar Seabird Group (CBird, formerly CSWG) since its inception in 1993. The first circumpolar harvest overview was published in 2001 (Denlinger & Wohl 2001), and this included a review of the seabird harvest situation in Iceland (Petersen 2001). Since then updates have been tabled at the annual CBird meetings in 2002, 2003 and 2004 (see CBird meeting reports).

Iceland is known to have had 24 breeding seabird species. One of these, the great auk, is extinct, while the dovekie, stopped breeding in 1997 although still a common winter visitor (Petersen 1998). Of the remaining 22 breeding species, three are completely protected and no harvesting allowed at any stages, i.e. on leach´s petrel, storm petrel, and manx shearwater. Of the 19 left, harvesting in one form or another is allowed, under guidance of the Act on conservation, protection and hunting of wild birds and land mammals (no. 64/1994). Seabird species, which do not breed in Iceland, and vagrants, are fully protected.

2. Harvest regulations and harvest survey methods

Anyone with a hunting licence can hunt if the respective landowner grants his permission. Landowners, be they the state, other local authorities or individuals, have the right to refuse hunting, or allow within other regulatory stipulations. Landowners have hunting rights 115 m out to sea, beyond that are commons. Seabird harvest is leased out in some areas, e.g. individual seabird cliffs, and egg-collecting is a source of income for some local rescue clubs. On the Westman Islands (S-Iceland) and Stykkishólmur municipality (W-Iceland) local authorities lease out puffin-catching to hunting clubs or individuals, while some puffin colonies are commons.

The Ministry for the Environment supervises the act on conservation, protection and hunting of wild birds and land mammals (no. 64/1994). Harvesting, conservation and protection of birds, including seabirds, is governed by this act which took force on July 1st, 1994. This superseded the old bird protection act of 1966, act on fox- and mink-hunting from 1958, and some other minor articles. No one

Þorsteinn Jónsson: *Puffin-catching on, Westman Islands*, Iceland, ca 1890.

agency specifically regulates all aspects of hunting, but the Environment Agency (as a management authority) and the Icelandic Institute of Natural History (as a research institute) are advisory to the ministry on matters of bird conservation and hunting.

Certain seasons are in force for hunting or harvesting of individual species. Maximum range for the hunting seasons is laid down in the wild bird and mammal act for those species for which hunting is allowed. The actual hunting seasons can be shortened but never lengthened with a special regulation (the one presently in force is no. 456/1994, with amendment no. 506/1998). The Icelandic Institute of Natural History and other research bodies carry out research into the effect of hunting, such as hunting pressures. No program specifically relating to seabirds is underway, although one is currently being developed. A project is underway repeating (since 1983-85) total counts at all the major bird cliffs. These cliffs include the total murre populations breeding in Iceland, the majority of the razorbills, and substantial parts of fulmars and kittiwakes.

Basically only guns (up to 12 bore) and rifles can be used for hunting. Various inhumane methods, in line with the Bern Convention, are totally forbidden by law. Three gull species can be killed throughout the whole year (considered pest species), some of the seabird species September 1st to March 31st, except auks to May 10th. Special concessions exist for puffin, razorbill, common murre and thick-billed murre, which can also be taken with a triangular pole net at colonies between July 1st and August 15th. In effect this type of hunting is confined to puffins.

Eggs and/or young of the following seabird species can be legally taken: gannet, cormorant, shag, fulmar, great skua, great and lesser black-backed, black-headed, herring, and glaucous gulls, kittiwake, puffin, common and thick-billed murres, razorbill, black guillemot, and arctic tern. The periods for egg-collecting or catching of young are not specified in the law, except for arctic tern, herring gull, glaucous gull, and black-headed gull, the eggs of which must not be taken after June 15th. Practically no gannet, shag and cormorant eggs are taken nowadays, others mainly incidentally but egg-harvesting of the bird-cliff species (kittiwake, common and thick-billed murres, razorbill) need substantial operations because of the habitat. Most of the larger cliffs in the country are visited every year for this purpose but are generally not covered as thoroughly as in earlier times.

No specific wildlife enforcement service is found in Iceland and the general police uphold the law on wild birds.

3. Locations, species and numbers harvested

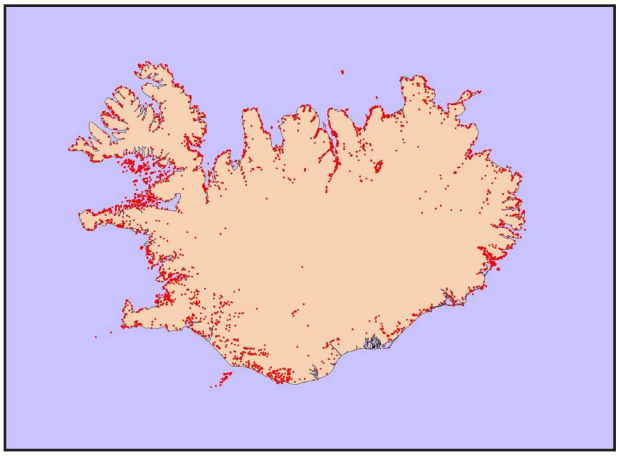


Fig. 1. The distribution of seabird colonies in Iceland. The map shows around 3500 colony sites but it is estimated that individual sites may be as many as 4500. From Bakken *et al.* (2006).

Locations

Iceland is estimated to have around 4500 seabird colonies, with a total breeding population of about 7.5 million pairs (Bakken *et al.* 2006). These are distributed widely in the country, while the largest colonies exist on or near the coast (Fig. 1).

Hundreds of seabird colonies are utilized in Iceland, in every part of the country, both for birds and eggs. Most seabirds breed on islands or coastal cliffs. Bird cliffs proper are around 40, while fulmar, arctic tern, and gull colonies number some thousands of different sizes. Some species, like fulmar, arctic tern, great black-backed gull, and lesser black-backed gull, nest inland but the largest of these colonies (and those harvested) occur on or within some kilometres from the coast. No overview is available on where egg-harvesting takes place and in what quantities so such a compilation is much needed. Nowadays common eiders are mainly harvested for their down, and as such differs from the other seabird species. In earlier years some seabirds, such as the auks, were utilized for their feathers. Some species (gulls, parasitic jaeger) are still killed in or near eider colonies (as predators

and competitors). Gulls are also killed in towns or villages and at rubbish tips, airports, fish-processing plants, fish farms, etc., as nuisance species, even at many agricultural farms.

Seabird hunting takes place outside the breeding season at many localities along the coast (shag, cormorant), or from boats out at sea (mostly auks). The locations determine the available species. At-sea hunting takes place practically all around Iceland, e.g. for various alcids. This is thought to be most intense in the neighbourhood of towns and villages, e.g. the north and east fjords, northwestern fjords, and Faxafloi region in the southwest-west, but no compilation has been made on this issue.

Species

General reviews of harvesting of seabirds have been published on several occasions (Petersen 1982, Kristjánsson 1986, Petersen 1996, 2001, 2005). The species mostly utilized nowadays are common eider, arctic tern, kittiwake, great and lesser black-backed, black-headed, and herring gulls, puffin, common and thick-billed murres, razorbill, and black guillemot, to a lesser degree cormorant, shag, fulmar, gannet, and glaucous gulls.

Eiders hold a special place with Icelanders. The long tradition of down-collecting makes the eider economically the most important seabird species by far, totalling revenues of ca $4 million dollars per year. Much of this income comes from exports, especially to Denmark, Germany, and Japan. Historically egging was the most important use of common eiders. Although still allowed egg-collecting is minimal at present times. The birds themselves are fully protected and conservation actions for this species dating back to 1787 constitutes the oldest conservation action in Iceland.

Gulls and terns are mostly harvested for their eggs, but gulls are also shot as pest species

What is harvested (birds, eggs, chicks, down)

Of the seabird species utilized nowadays the table below provides an overview at what stages in their life cycle they are or can be utilized.

Table 1: Seabird species harvested in Iceland and stages at which they are or can be utilized according to legislation. 1 = utilized; 0 = not utilized; (1) = insignificant use

species:		what		utilized:	
English name	**scientific name**	**eggs**	**young**	**fullgrowns**	**feathers/down**
Fulmar	*Fulmarus glacialis*	1	1	1	1
Gannet	*Sula bassana*	0	1	(1)	1
Cormorant	*Phalacrocorax carbo*	1	1	1	0
Shag	*Phalacrocorax aristotelis*	1	1	1	0
Common eider	*Somateria mollissima*	1	0	(1)	1
Parasitic jaeger	*Stercorarius parasiticus*	0	0	(1)	0
Great skua	*Stercorarius skua*	(1)	1	0	0
Black-headed gull	*Larus ridibundus*	1	0	0	0
Lesser black-backed gull	*Larus fuscus*	1	0	0	0
Herring gull	*Larus argentatus*	1	0	0	0
Glaucous gull	*Larus hyperboreus*	1	1	0	0
Great black-backed gull	*Larus marinus*	1	(1)	0	0
Kittiwake	*Rissa tridactyla*	1	1	0	0
Arctic tern	*Sterna paradisaea*	1	0	0	0
Common murre	*Uria aalge*	1	0	1	0
Thick-billed murre	*Uria lomvia*	1	0	1	0
Razorbill	*Alca torda*	1	0	1	0
Black guillemot	*Cepphus grylle*	1	1	1	0
Common puffin	*Fratercula arctica*	(1)	1	1	(1)

For one of the species (eider) only the down and eggs can be harvested, but only eggs for arctic tern. Parasitic jaeger and great skua are protected during the breeding season, although, as an exception, the former can be killed in and around eider colonies. Three species of gulls (lesser black-backed, great black-backed, and herring) are totally unprotected throughout the year.

Numbers (birds/eggs/nest) harvested

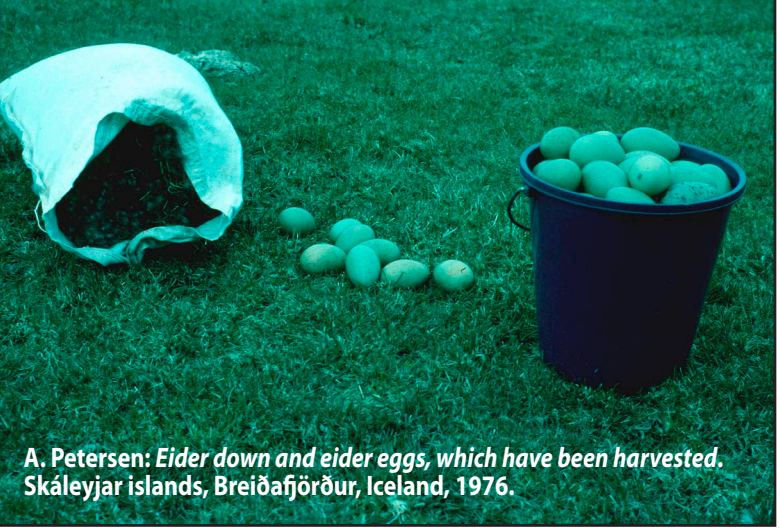
Hunting statistics has been compiled in Iceland since 1995, as laid down in the current legislation (no. 64/1994). With this began the second period of compilation of harvest statistics in Iceland. Similar data were collected during 1898 and 1939 (Statistical Bureau reports), but was discontinued for one reason or another. The regulation as regards hunting statistics only relates to the taking of birds. Eggs and eider down are not included but for the down the amount of export is found in trade reports while domestic trade reports cover the internal market. The amount of down collected is therefore known but no similar overview is available for egg-collecting.

Everyone wishing to hunt has to register for a hunting licence with the wildlife management section of the Environment Agency and pay a small fee (ca $40). Landowners need a special licence to utilize traditional natural resources, egging, puffin-catching, eider-down collecting, and such. Endorsement from the local sheriff is needed on what constitutes “traditional resources”. Would-be hunters have to take a course in the handling of firearms, bird identification, nature conservation, general ecology of quarry species, etc, and pass an examination. A hunting report has to be sent in annually to renew the hunting licence. The fee goes in a fund used for compiling the hunting statistics and to carry out research on hunted or harvested species, either for their economic value or as pests. In 2006 hunting licenses in Iceland were around 10 thousand, relating to 3% of the Icelandic human population. About 2-3% of the hunters are women (http://english.ust.is/assignments/Wildlife_Management/). Figures for the average numbers of birds hunted 1995-2002 are given in Table 2.

On average 350 thousand seabirds are killed per year but no information is available on the number of eggs collected. The largest number of birds caught of any one species is puffin, varying from 150 to 233 thousand per year. These are mostly fullgrown birds (the majority immatures) caught at colony in pole nets, but to a much lesser extent shot at sea. Altogether between 86 and 113 thousand common murres, thick-billed murres, and razorbills (usually considered as one group by hunters) are killed annually, primarily shot at sea but an insignificant extent is taken in pole nets at colonies. The numbers shot may vary according to how many birds caught as bycatch are marketed (although the use of bycatch is illegal). Bycatch numbers (of which there are only estimates) are roughly the same as birds shot of the three large alcids (Petersen 2002). These mortality factors need to be considered together when looking at population

Table 2. Numbers of birds hunted according to hunting statistics (Environment and Food Agency).

Species	Average/year 1995-2002	Estimated % of population
Fulmar	9103	<1
Gannet	748	<1
Shag	3785	25
Cormorant	2459	20
Parasitic jaeger	1770	6
Black-headed gull	2090	2
Great black-backed gull	26402	25-30
Lesser black-backed gull	24207	25
Herring gull	5887	20
Glaucous gull	3847	15
Kittiwake	1661	<1
Puffin	163585	2-3
Razorbill	22936	1-2
Common murre	59968	1-2
Thick-billed murre	17513	1-2
Black guillemot	4116	10



A. Petersen: *Eider down and eider eggs, which have been harvested.* Skáleyjar islands, Breiðafjörður, Iceland, 1976.

impact of birds killed in Iceland. Other seabird species are taken for food in much less numbers. Attention should be drawn to the high figures in the table of gulls, esp. lesser black-backed and great black-backed, killed as pest. The hunting data since 1995 are available on the web (http://www.ust.is/Veidistjornun/Almennt/Veiditolur/).

About 3 tonnes of cleaned eider down is collected per year from nests. Around 70 nests are needed for one kilo of cleaned down. This is collected either during the incubation period (all, or in part) and/or after the nest has been left. All export of eiderdown is entered into official export records. The export of eider eggs is illegal.

The impact of hunting is quite variable depending on the species. Harvest levels are presently not thought to greatly affect most species at the national level, although the hunting of shag, cormorant, black guillemots, and some gull species need special attention. There are indications as to effects (at least temporal) at individual colonies but these are mostly not well documented and further research is needed. With the compilation of the hunting statistics and the indications which these give, research programs into population sizes and the effects of harvesting, both local and national, should be undertaken. This specifically relates to species like great black-backed gull, cormorant, and the alcids, esp. puffin, common murre and razorbill. Little information is available on egg-collecting at the national level and specific research programs needed for this type of harvest, esp. relating to kittiwake, razorbill, and common murre.

The highest percentage of the respective population is that for shag and cormorant and the large gulls (great black-backed, lesser black-backed, and herring). For each species estimated 20-30% of the populations are taken each year. Of the glaucous gull and black guillemot some 15 and 10% are taken respectively. For most other species only a few percentage of the populations are taken, even for such heavily-hunted species (by numbers) like the puffin (2-3%).

4. International matters

Nowadays 22 seabird species breed in Iceland. Their populations either migrate or disperse outside Icelandic waters during the off-season or are sedentary. Three seabird breeders are entirely sedentary (shag, cormorant, eider) while three more are overwhelmingly sedentary (great black-backed gull, common murre, black guillemot). At the other end six species are totally migratory (parasitic jaeger, great skua, lesser black-backed gull, arctic tern, thick-billed gull, puffin). The other ten species are partially migratory or dispersal species, which may be coming and going throughout the non-breeding period.

Two species annually visit Icelandic waters during the non-breeding season (dovekie, Iceland gull). Two Southern Hemisphere species regularly visit Icelandic waters during the austral winter (great shearwater, sooty shearwater) and two High Arctic species migrate through the Icelandic Economic Zone (long-tailed jaeger, pomarine jaeger).

Then there are those species which breed in Iceland but individuals of other populations visit Icelandic waters, both from the north and south. These species include fulmar, glaucous gull, kittiwake, common murre, thick-billed murre, and puffin.

Iceland clearly shares large seabird resources with other countries, not only the species that breed in Iceland but also birds that breed elsewhere. It is important to identify those conservation issues that may threaten these populations, be these issues within Iceland or elsewhere. Cooperation is therefore needed for successful solutions to conservation problems. One such issue relates to the thick-billed murres but he Icelandic breeding population has been declining for many years (Gardarsson 2006). A banding study was initiated as the International Murre Conservation Strategy and Action Plan (CAFF 1996) was being developed. The results to date indicate that Icelandic birds entirely leave for Newfoundland and West-Greenland in winter. Hunting in Greenland and oiling in Newfoundland waters have been identified as possible causes for this decline (Náttúrufræðistofnun

Íslands 2001). On the other hand a part of the Norwegian thick-billed murre population spends the winter in Iceland where they are subject to hunting. Banding recoveries indicate these birds are primarily of breeding age. With hunting of nearly 20 thousand birds annually the effect on the Norwegian population need study.

5. Cultural and economic significance of the harvest

Nowadays harvesting is mostly looked upon as a hobby, or to supplement primary sources of income. The most notable exception is the “eider-farming”, which has a firm basis in the Icelandic farming community, but even this is more and more becoming an income supplement for hobbyists. The eider down is now ca four million US$ annual industry. The profits go (unequally) to some 250-300 landowners, dependent on the size of their respective colonies. For many bird catchers, especially puffin hunters and egg collectors (primarily for razorbill, common murre, kittiwake, and fulmar eggs) a certain time of year is set aside for this practice, often part of the summer holiday period, as an annual reunion “of the boys”. Certain financial exchanges take place in connection with hunting and egging. A small market is in mounted birds, both domestic and as part of the foreign tourist industry, especially around the ever popular puffin.

Basically traditional catching or collecting methods are used but modern changes in technology have also taken place, e.g. the use of 4-wheel drive vehicles or tractors and the use of two-way radios when descending cliffs. Although the basics are the same there have always been slight local variations in techniques, depending on the species and local situations. In some of the outlying islands, that are visited every year, the harvesters´ cottages have now become quite modernized. A historical review has been published recently on the traditions concerning seabird fowling in Iceland (Petersen 2005).

There are domestic sales of fully grown puffins, murres and razorbill (eggs and birds, either netted, shot, or by-catch), kittiwake and other gull eggs, and to a lesser extent fulmar eggs, gannet, shag and cormorant young. All exports of wild birds are subject to export licence from conservation authorities. Some export of puffins takes place to the Faeroes (both legal and illegal). An unknown but high proportion of the catch never hits the common market. It is consumed locally, given away to family and friends, or sold from person to person. Recent upsurge in seabirds as food has been seen. Wild game of different sorts, including seabirds, is being marketed as a delicacy or a speciality. The demand is not the least from restaurants, which are visited by both Icelanders and the increasing number of tourists alike.

6. Outreach programmes

No special outreach programmes are carried out in Iceland on seabird harvest. This group of birds, as are other harvested bird species, is dealt with as part of curricula for would-be hunters. The courses are supervised by staff of the Environment Agency. In 2007 an educational book was published, aimed for the hunting community (Gudmann 2007). This deals with hunting of all game species, hunting equipment, safety issues, the hunting licence system, governance of hunting issues, conservation, population dynamics, hunter responsibility, bird banding, hunting seasons, the legal framework, etc.

7. Management recommendations

In Technical Report no. 9 Seabird Harvest Regimes in the Circumpolar Nations (2001) two projects were recommended, which were needed specifically for Iceland:

- Conduct research on population sizes and the effects of harvesting, both local and national.
- Develop specific programs to assemble information on egg collecting, especially relating to black-legged kittiwakes, razorbills, and common murres.

Neither of these projects has been fully executed but some advances have been made on the former. A preliminary analysis of the impact of hunting has been made (Petersen, in prep.). Puffins are numerically the most harvested species of seabirds in Iceland. About half of the catch comes from the Westman Islands south of Iceland, where the puffin-catching culture is also strongest. A research program, with numbers of sub-projects, has been developed and was started in 2008. This program will deal with, among others, the effect of hunting on the puffin population, monitoring, population modeling, etc.

It is recommended that a compilation be made of the utilization of all major bird-cliffs in the country, dealing with (a) hunting (species, numbers), (b) egg-collecting (species, numbers), and (c) disturbance (from tourism, offshore fishery, hunters, egg-collectors, etc.).

Five general recommendations were included in the CAFF harvest report of 2001:

1. Improve knowledge of the level of seabird harvests nationally and for specific regions by routinely monitoring the annual harvest of seabirds and at colonies with substantial harvests
2. Develop a permit or license system to improve the information on the number of hunters and their harvests
3. Develop national or regional outreach and education programs to disseminate information on seabird harvests, improve the collecting of harvest information, and reduce unnecessary disturbance at colonies
4. Reduce the harvest of seabird populations which are declining at specific colonies or in specific regions
5. Involve local hunters and hunting organizations in developing or improving harvest regimes

The project mentioned earlier aims at improving harvest information at seabird cliffs (recommendation 1) while a general license system is already firmly in place (recomm. 2). The compilers of the harvest data in Iceland hold out a webpage relating to hunting and hunting statistics (recomm. 3). They also publish annually a booklet, so-called Hunter's Journal, describing the hunting license system, hunting statistics, giving various practical information such as the location of protected area, what to do with banding recoveries, hunting seasons of different species, the legal regime, etc. Popular accounts by scientists on specific issues are also published in the journal. Every new hunter and hunters renewing their license receive a copy of this booklet.

No outreach program has been directed at disturbance at colonies per se (recomm. 3), but the project suggested above aims, inter alia, at establishing baseline information on the types and levels of disturbance at major colonies. The CBird Group has published a report on disturbance at seabird colonies in the arctic countries (Chardine & Mendenhall 1998). Reducing harvest levels of declining populations (recomm. 4) implies information is available on population size, trends and harvest levels at specific colonies. As mentioned above only a preliminary analysis has been made on the possible effects of hunting on Icelandic seabird populations, and more detailed analyses are needed, including at the colony level. For a number of seabirds more detailed information on population size, not to mention trends, is also needed (Petersen 2000, 2003). Some hunting clubs collect harvest data (cf. Vigfúsdóttir, Kolbeinsson & Jónasson 2007), such as puffin-catchers and egg-collecting teams (recomm. 5). In 2003 a report on a number of issues relating to the accuracy of the hunting statistics and other issues was published, such as the reliability of species identification (auks, shag vs cormorants) by hunters (Jónsson *et al.* 2003).

Data included in the most recent report on seabird harvest in the Arctic i.e. that in CAFF Technical Report No. 9, are from 2001 (Denlinger & Wohl 2001). With each year more harvest data become available, hopefully giving a better picture of harvest regimes. Also, the recent indications of food shortage for seabirds have resulted in declines in harvesting of such species like shag, puffin, and kittiwake. Similarly increased awareness of avian flu has resulted in decreased egg collecting, esp. that of gulls. In earlier years local outbreaks of Salmonella caused the same effects. These effects are little quantified.

In the 2002 country report for Iceland (Circumpolar Seabird Group CBird IX. Progress Report September 2003: 32-34) it was suggested again that rather than revising the CAFF Technical Report No. 9 at this stage greater emphasis would be placed on circumpolar issues (besides pressing national issues). As before four suggestions are offered here to further the harvest issue within the Circumpolar Seabird Group, and their findings could be published as a technical report:

- Circumpolar Seabird Group should identify the kind of information and which parameters are needed to fully describe seabird harvesting and its effects on respective populations. – This compilation may help countries, which do not have the required data for harvesting analyses.
- Identify those circumpolar harvest issues, which

first and foremost need focused attention by the Circumpolar Seabird Group. - This could be done by analyzing the recommendations of the 2001 harvest report, identify common themes, with possible additions from participants.

- Identify declining species and populations, for which harvest is a known or suspected vector, calling for concentrated research projects between all or several arctic countries. – Is the Group focusing on known problem areas, where harvesting is an issue?
- CAFF countries should increase efforts to define and assess the impact of harvest pressures on migratory arctic birds and in particular in relation to threatened species, to contribute to future sustainable management of the populations. - This is one of the recommendations on Arctic Migratory Birds at the Songli 2000 meeting (Scott 2001: 53).

In the most recent years there have been global issues, which may have potential effects on seabirds and seabird harvest, i.e. avian influenza and climate change. The disease has not been identified in Iceland, but special concerns have been expressed over effects of food shortage, presumed to be climate-change related, on seabirds, e.g. the common puffin, kittiwake, arctic tern, and shag. The last species has declined seriously during past decade that according to IUCN criteria this should be included on the red list of endangered species (cf. Gardarsson & Petersen 2007). The puffin is the most commonly harvested seabird species in Iceland. In 2005-2007 the puffin harvest was abnormally low, associated with poor feeding conditions and breeding performance. Climate change has been implicated as the source for these changes (Vigfúsdóttir, Kolbeinsson & Jónasson 2007).

The year 2006 saw the end of a Nordic project on harmonizing databases (Bakken *et al.* 2006). Status reports were compiled from Iceland, as well as Greenland, Faeroes, Jan Mayen and Svalbard. During the project a colony database computer program was developed and this is available on the internet free of charge (ftp://ftp.npolar.no/Out/NordicDatabase/). Other arctic countries are considering whether this program can be used in all the circumpolar countries.

In 2007 a research program was started on eiders and climate change. Use is being made of the long tradition of eider-down farming in the country, where by long data series are available for individual eider colonies, some over a century back. The colony data needs to be compiled from individual eider farmers and will be analyzed in relation to climate models.

In 2007 a questionnaire from the African Eurasian Waterbird Agreement (AEWA) was compiled for Iceland dealing with hunting and trade legislation.

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Seabird Harvest in Norway and Svalbard

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1. Introduction

Harvesting of marine birds has a long tradition in north Norway and used to be widespread and important. Today, the extent of harvesting is reduced and subject to strict regulations. Egging, down collecting, and harvesting of adult birds and chicks were important commercially and for food supply in the past for the rural residents of coastal northern Norway (Wold 1981, Bakken & Anker-Nilssen 2001).

In Svalbard, common eiders have been harvested since the 16th century, but reliable harvest data exist only from the middle of the 18th century onwards (Norderhaug 1982). Both eggs and down were heavily collected and the population declined greatly before it was protected by law in 1963. Hunters also used to visit seabird colonies where they collected eggs and adult birds. At Bjørnøya, 50,000-60,000 eggs were collected annually between 1952-1958, mainly from common and thick-billed murres. This activity was stopped in 1971 (Rossnes 1981).

2. Harvest regulations and harvest survey methods

The hunting species/seasons in Svalbard and north Norway (Nordland, Troms and Finnmark) are shown in Table 1 and 2, respectively. Marine species not mentioned in the tables are protected throughout the year. The hunting is regulated through the use of hunting licenses, and any harvest has to be reported annually both to the local and national authorities.

In Norway, land owners are allowed to collect eggs from herring gulls, great black-backed gulls and common gulls until 14 June. Collection of eggs from common eiders is only permitted before 1 June in areas where the tradition of housing eiders is maintained. In Svalbard, egging is in general prohibited, but the

Tromsø University Museum: *Harvest of murre eggs at Bjørnøya*, Bear Island.

Governor of Svalbard may issue special permits to allow egg collecting of common eider, great black-backed gull and glaucous gull.

Collection of common eider down is allowed on the Norwegian coast (in summer) after the chicks have left the nest. In Svalbard, collection of down is prohibited, but the Governor may issue special permits to allow down collection from common eiders outside the protected areas. In 2007, the Governor allowed (as a trial arrangement) some local hunters to collect down also inside some of the protected areas on the west coast of Spitsbergen. The prerequisite for this trial was that the hunters did not enter the protected areas before the chicks of all species breeding there had left the nest.

Table 1. Hunting regulations for marine birds in Svalbard.

Species	Hunting period
Northern fulmar *Fulmarus glacialis*	September 21 - October 31
Thick-billed murre *Uria lomvia*	September 1 - October 31
Black guillemot *Cepphus grylle*	September 1 - October 31
Glaucous gull *Larus hyperboreus*	August 11 - October 31

Table 2. Hunting regulations for marine birds in north Norway, excluding Svalbard.

Species	Hunting period
Great cormorant *Phalacrocorax carbo* European shag *P. aristotelis*	October 1 - November 30
Common gull *Larus canus* Herring gull *L. argentatus* great black-backed gull *L. marinus*	August 21 - February 28

3. Locations, species and numbers harvested

The annual harvest both in northern Norway (Nordland, Troms and Finnmark counties) and Svalbard is relatively small compared to other arctic countries.

In Svalbard, a total of about 150 marine birds are shot annually (Figs. 1 & 2) of the four species northern fulmar, glaucous gull, thick-billed murre and black guillemot. The hunting takes place on the west coast of Spitsbergen, mainly close to the settlement Longyearbyen, the main settlement on the archipelago. The main species harvested is black guillemot.

In northern Norway, ca. 4000 birds are shot annually (Figs. 3 & 4). The hunting takes place more or less along the whole coast, but is often concentrated around cities and communities. The main species hunted are gulls, i.e. common gull, herring gull and great black-backed gull. These species are not reported as separate species, but lumped into one group. The two other species are great cormorant and European shag.

Harvesting, in general, can not be said to be a significant threat to marine birds in northern Norway and Svalbard because of the relatively strict regulations and low annual harvest. In northern Norway and Svalbard in total approximately 5,000 birds are shot annually (all species; estimate based on hunting statistics).

4. International matters

Thick-billed Murres from Svalbard have been hunted regularly in the Northwest Atlantic for many years, and birds from other parts of the Northeast Atlantic are also shot in this area (Nikolaeva *et al.* 1996, Bakken & Mehlum 2005). In Greenland and Newfoundland 283,000-386,000 (Falk & Durinck 1992) and 173 000-287,000 (Chardine *et al.* 1999) are shot annually, respectively. Thick-billed murres are also hunted in Iceland, and in 1995-1997 between 15,000 and 20,000 birds were shot annually (Petersen 2001). Of birds ringed as chicks in Svalbard about 5% are recovered in the Northwest Atlantic during the first five years after ringing (Bakken & Mehlum 2005), and this figure is comparable to the recovery rates estimated for chicks ringed at Coats Island in Canada in 1984-1987 (Donaldson *et al.* 1997).

The regular hunt in the Northwest Atlantic may be the main reason why the thick-billed murre breeding on Bjørnøya (Bear Island) have a lower adult survival than the common murre, who probably winters in the southern part of the Barents Sea (Bakken & Strøm in manus). However, as long as no studies have been conducted on thick-billed murre populations not subjected to hunting, the normal range in adult survival in the species is not known. The winter hunt in the Northwest Atlantic may pose a potential threat to the thick-billed murre population in Svalbard. However, at the moment, monitoring of population development and adult survival on Bjørnøya indicates that the population is stable and that there is no need for immediate management actions (Bakken & Strøm in manus).

5. Cultural and economic significance of the harvest

In general, harvesting of marine birds has a long

tradition in north Norway and in Svalbard, and used to be of both cultural and economic importance. Nowadays, few people are involved in the hunt, and most see the recreation (and cultural) aspect of it as the most important. The economic importance is small, although harvest of eider down can be of some importance. In Svalbard some few professional hunters still operate, and the collection of eider down makes up an important part of their income in some years.

6. Outreach programmes

There has not been any outreach program targeted at harvest of marine birds or the hunters involved in this in Norway in recent years.

7. Management recommendations

In CAFF Technical Report No. 9 (2001) "Seabird Harvest Regimes in the Circumpolar Nations" the following recommendations were given for Norway including Svalbard:

1. Develop long-term monitoring programs for game birds to evaluate the population effects of those harvested
2. Harmonize and coordinate seabird monitoring in the Russian and Norwegian areas.
3. Initiate and continue special studies for cormorant, greylag geese and thick-billed murres to improve harvest information on these populations

Since the publication of Technical Report No. 9, recommendation 1 has been implemented through the SEAPOP Programme (Seabird Populations). The main goal of SEAPOP is to coordinate a long-term, comprehensive and standardised study of the most important aspects of seabird numbers, distribution, demography and ecology in Norway including Svalbard and adjacent sea areas (Anker-Nilssen *et al.* 2005). The national monitoring of population trends that has been ongoing since the 1980s will be continued and extended with more sites and species, and the monitoring of reproduction, adult survival rates and diets of selected seabird species on the established key-sites will be extended. As the program include most of the harvested species in Norway and Svalbard, it makes it possible to assess population status and the possible impact of harvest on these populations in a much better way than prior to the program. Recommendation 2 is being implemented and a joint Norwegian-Russian monitoring plan is being prepared for 2008. Recommendation 3 has not been implemented, but is still seen as important to improve the harvest information on these populations.

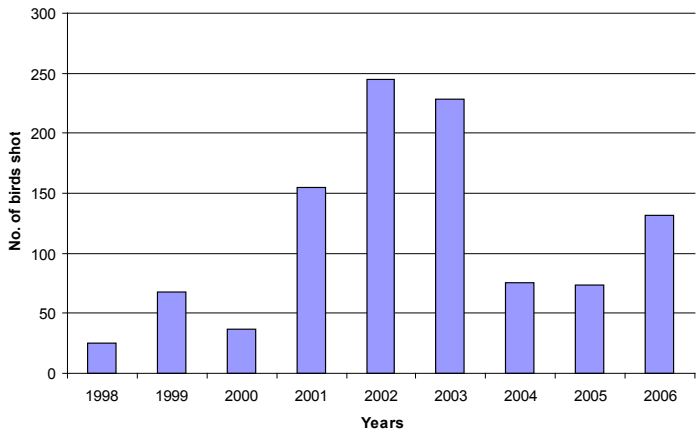

Figure 1. Number of marine birds (glaucous gull, black guillemot, thick-billed murre and northern fulmar) shot in Svalbard in the period 2001-2006. Source: The Governor of Svalbard.


Tromsø University Museum: *Harvest of atlantic puffins at Røst*, Nordland.

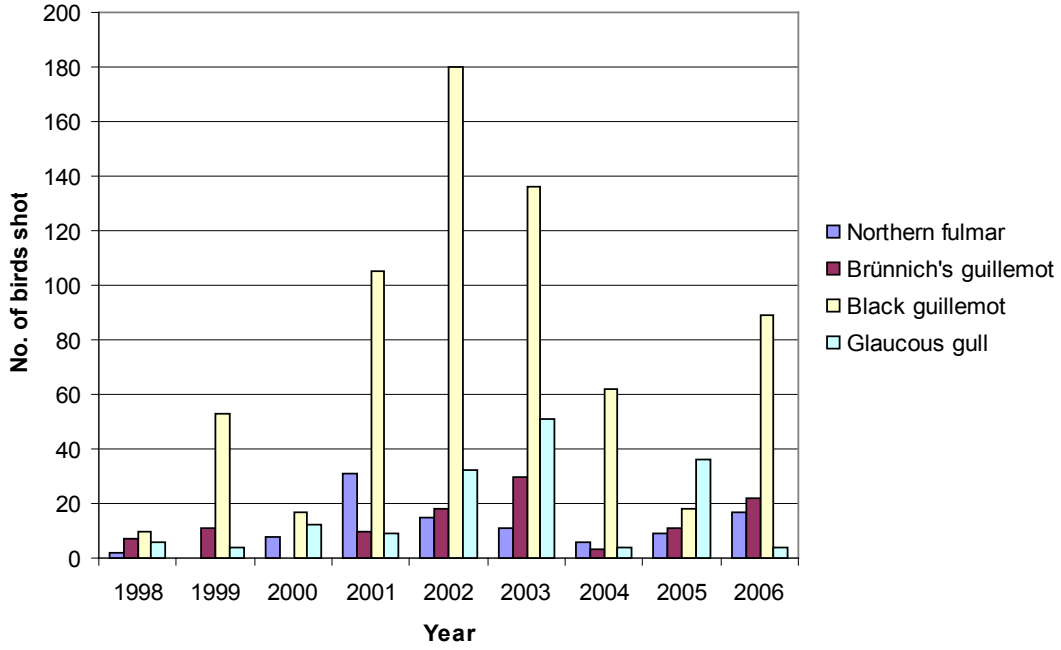

Figure 2. Number of birds shot of glaucous gull, black guillemot, thick-billed murre and northern fulmar in Svalbard in the period 1998-2006. Source: The Governor of Svalbard.

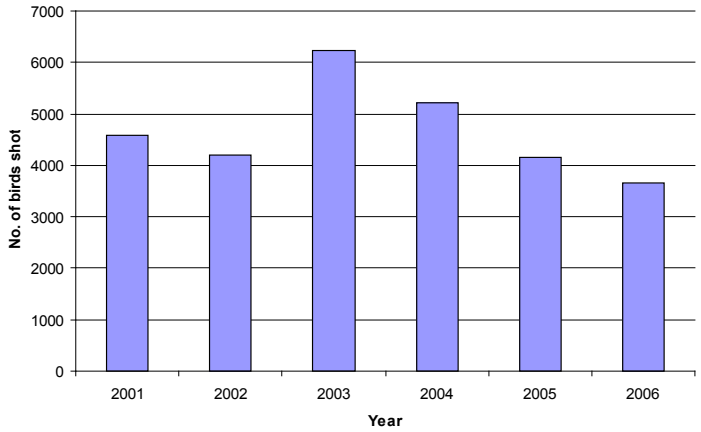

Figure 3. Number of marine birds (herring gull, great black-backed gull, common gull, and black-legged kittiwake, great cormorant and European shag) shot in northern Norway (Nordland, Troms and Finnmark counties) in the period 2001-2006 (Source: Statistics Norway).

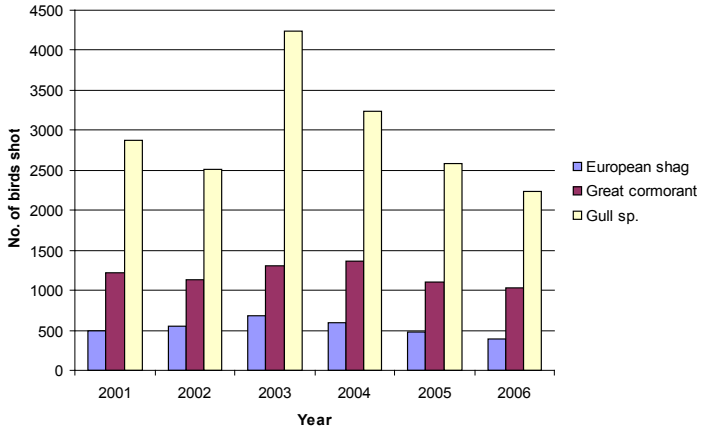

Figure 4. Number of birds shot of gulls (herring gull, great black-backed gull, common gull, and black-legged kittiwake), great cormorant and European shag in northern Norway (Nordland, Troms and Finnmark counties) in the period 2001-2006 (Source: Statistics Norway).

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Seabird Harvest in Russia

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1. Introduction

In spite of the wide-range distribution of the seabirds along the arctic coasts of Russia, seabird harvest has never been of primary importance for local economies and communities. Most of the seabird colonies in the Western and Central Russian Arctic are located on the remote offshore islands originally not inhabited by northern natives. In Eastern Russian Arctic, especially in Chukotka and Kamchatka where seabirds nesting grounds are more accessible, seabird harvest is more important for local people. Indigenous people of the NE Russia have been harvesting seabirds since ancient time. There is some archeological evidence of the harvest based on the remains of seabirds and special hunting instruments for birds. Nowadays, seabirds and their eggs are harvested by the northern indigenous people to a lesser degree.

Since colonization of the northern areas has commenced, non-native people joined northern indigenous people for seabird harvest. The earliest newcomers spread along the shores of the White and Barents seas as early as in X-XI centuries, known as Pomors, developed their life style based on marine resources included to a certain extent seabird harvest. However, most widespread colonization and corresponding harvest occurred after mid-XVIII.

Importance of different seabird species as a harvested object varies considerably along the vast territory of the Russian Arctic and primarily depends on the regional availability. In Russia, the waterfowl is traditionally a major hunting target especially in the North, while colonial seabirds and their eggs have never been as important since major arctic colonies are located far from traditional living places. Thus from the entire group of seabirds considered by CAFF CBird group largely eiders are harvested in the Russian Arctic, to a less extent alcids and gulls, while other groups (divers, cormorants, skuas and terns) are of very limited use. Importance of eiders as hunting object also depends on availability of geese, since the latter

Hallvard Strøm: *Bezymyannaya Bay one of the largest thick-billed murre colonies*, Novaya Zemlya.

is more desirable trophy as compare to eiders.

Geographically the most extensive seabird harvest occurred in the easternmost portion of the Russian CAFF area including Kamchatka, Commander Islands and Chukotka, to a less extent it is practiced in the westernmost portion, i.e. Barents Sea Region, while in central Russian Arctic segment harvest occurs only in a form of seaduck hunting, no seabird colonies are legally harvested in Central Siberian Arctic.

2. Current harvest regulation

The federal pieces of legislature primarily regulating seabird harvest in Russia are the following: Federal law about the animal world (1995, last updated in 2007), typical hunting regulations of the Russian Federation (1988, last updated in 2007). Based on these documents, a general list of hunting objects (Executive Order 859) was developed. Each constituent entity of the Federation (for the Arctic region they are the following: Murmansk District, Archangelsk District including Nenets Autonomous Okrug (AO), Tumen District including Yamal-Nenets AO & Khanty-Mansy AO, Krasnoyarsk Territory including Dolgan-Nenets & Evenksky AO, Sakha (Yakutia) Republic, Chukotka AO, Magadan District, Kamchatka District including Koryaksky AO) develop their regional Hunting regulations specifying hunting rules and providing regional list of hunting objects. Lists of hunting objects are also restricted by the Red Data Book of the Russian Federation and regional Red Data Books of relevant constituent entity of the Federation. Hunting is generally allowed in specified hunting grounds. Regimes of specially protected areas (SPAs) may ban hunting and harvest within their territories. There is a developed network of SPAs in the Russian Arctic with over 250 SPAs of different levels including 12 strict nature reserves where hunting and other harvest activities are banned. Other categories have different regimes, but all of them aim at protection and sustainable use of nature resources including seabirds. Other federal pieces of legislature regulating seabird protection and use are federal law about environmental protection, federal law about the SPAs, federal law about the territories of traditional nature use of the Indigenous Minorities of the North, Siberia and far east of the Russian Federation and some others. New federal low about hunting is currently under consideration for signature in the State Duma.

Seabirds are not considered hunting objects for the general public as stated in the list of hunting objects supplemented the federal law about the animal world. Egging is prohibited throughout Russia by the typical hunting regulations. The penalty for egg collecting is half that for illegally killing of adult birds of corresponding species while for the nest destruction is three times higher. Hunting is allowed during open hunting seasons in spring and autumn. Spring waterfowl hunting allows killing of geese and drakes only. Exact timing is determined seasonally on a regional level and hunting dates are declared by separated executive orders issued regionally by local governments twice a year.

There is an exception in hunting regulation for the Indigenous Minorities of the North. They are allowed to harvest seabirds including cormorants, divers, alcids, gulls, skuas, and terns excluding species and populations red-listed both on federal and regional levels (Executive Order 859). For northern indigenous people as well as for the Komi, Yakut and other peoples inhabiting North and maintaining nomadic life style hunting for their families sustenance is allowed all-year-round in all types of hunting grounds and using all allowed hunting equipment including traditional hunting methods and tools (typical hunting regulations). These people are also not to pay for the hunting license.

Final legislation regulating mutual relationships between different normative acts is a matter regional authority. It should be mentioned, however, that there are still many uncertainties and inconsistence between normative acts, especially regarding hunting rights of indigenous people.

The major uncertainty concerning definition of hunting objects deals with eiders. Although waterfowl, including geese and ducks, is one of the major game bird resources in Russia, eiders have special status. For the first time, after eider populations in the Barents Sea region has been largely damaged by unsustainable down collection, egging and killing, all eider species got special protection: according to the Governmental Executive Order from 10.02.1930 a first Regulations about game husbandry banned

eider egging and hunting since 1931. Further, The Executive Order of the Government (1956) allowed exploitation of seabird cliffs and eider colonies for northern indigenous people according to decision of local authority of Main Hunt Administration of Russian Federation.

Nowadays, hunting rules for eiders are regulated differently by regional normative acts. In some regions eider populations are red-listed, i.e., excluded from the list of hunting objects for all categories of hunters (like common and Steller's eiders in Murmansk District, common, Steller's and spectacled eiders in Yakutia). Moreover, hunting of all eider species is statute-banned in Sakha (Yakutia) Republic. Regional executive orders about opening hunting season usually list hunting species specifically for the coming season, and in some regions eiders are mentioned as hunting objects (i.e., common and king eiders for spring hunting 2008 in Chukotka AO).

At the same time, considerable poaching including taking both birds and their eggs does occur and its magnitude is not evaluated. Russian Arctic largely remains low populated by people and has undeveloped patchy-distributed infrastructure. The problem of illegal harvest is more pronounced in remote coastal areas with poor connection and insufficient food supply provided to their inhabitants. Magnitude of illegal harvest depends on accessibility of birds and their nesting grounds, i.e. it is higher in the vicinities of settlements. Illegal harvest principally occurs all along the arctic coast of Russia and affects most available species. Eggs are taken mostly from common and thick-billed murres, larger gulls (Larus spp.), kittiwake, and eiders (mostly common eider). The most seabird illegally killed, are eiders. Poaching involves some threatened species like Steller's eider (Eastern Russian Arctic) and ivory gull (egging confirmed for one site). Recently developed commercial activities (e.g., hunting tourism) poses new threats to the seabirds in terms of poaching (using of prohibited methods, violation of timing, involving species under ban).

3. Harvests by region

Nowadays, there is no well established federal monitoring system for the hunting bags in Russia, while sustaining harvest by northern indigenous people is not assessed at all. Since seabirds are not considered hunting objects for general public and egging is banned, the only contemporary data available on seabird harvest are obtained as a result of occasional advanced investigations (see below). Nevertheless, data on waterfowl hunting bag survey conducted in 1998 – 1999 allowed to draw several interesting conclusions about hunting pressure and importance of hunting in different regions (Waterfowl population management: http://de.msu.ru/~vart/ducks/chap5.html). Hunters' density is higher in the arctic region as compared to the rest of Russia and peaked in Sakha (Yakutia) and Koryaksky AO with more than 100 hunters per 1000 inhabitants. At the same time, the arctic demonstrates lowest hunters' density estimated per 1000 sq. km of wetlands (minimum in Taimyr with 7/1000 and highest in Murmansk District with 370/1000 against the Russian maximum exceeding 300,000/1000). Integrated relative index (based on hunters numbers, wetlands area, and hunting bags) describing development of the hunting and reflecting its importance for regional community shows that in all but Murmansk District regions of the arctic importance of the hunting is considerably higher in the most other regions of Russia. All these statistics are relevant to eider hunting to a certain degree.

Barents Sea Region

The most exploited seabird colonies in the region are those along the western coast of Novaya Zemlya Archipelago where the largest in the NE Atlantic colonies of thick-billed murre are located.

First to use seabirds in the Novaya Zemlya colonies were Pomors who started regularly trips to exploit wildlife resources of Matka (Novaya Zemlya Archipelago) in XVI – XVII centuries as well as expeditions of pioneering arctic explorers. However, seabird harvest was only to sustain themselves during expeditions. Commercial seabird harvest commenced by Russians and foreigners (mostly Norwegians) in XIX century was not of primarily importance as compared to the fishing, sealing, whaling and goose hunting. One of the first published record concerning thick-billed murre harvest in the Barents Sea region is from early XIX century (Lepekhin 1814). Special teams of collectors caught thick-billed murre on the colonies of Novaya Zemlya, salted them, and used them for food or transported them to Arkhangelsk to

sell. Local people used meat, feathers, and skins of the birds. From the mid-XIX century to the beginning of the XX century, tens of thousands of birds and their eggs were collected annually (Sidorov 1873, Ukhtomski 1881). Some of the birds were used to feed sled dogs and some eggs were used for food.

The most extensive harvest in the seabird colonies occurred in mid-XX century (1920s – 1950s). At Besymyannaya Bay (the largest seabird colony on Novaya Zemlya) 342,500 murre eggs were collected and more than 12,000 adult birds were killed in one season of 1933 (Krasovski 1937). Easily accessible flat breeding ledges allow trade workers to walk along them with big baskets for egging. For killing adult murres they used spiked poles. During World War II murres and their eggs collected on Novaya Zemlya provide valuable food supply for starving citizens of Archangelsk. Thus, in summer 1942 the special expedition recruited from teenagers and students harvested ca. 5,000 eggs and over 20,000 carcasses of murres (Bulatov 2000). However, in other cases egg harvest have been estimated as high as 500,000 eggs (Krasnov 1995).

Millions of eggs and hundreds thousand of birds harvested from mid-1930s till 1950s. In 1947, the Novozemelski Branch of Seven Island State Nature Reserve was established and recommendations restricting harvest to ensure sustainable use were developed: (1) harvest only part of the colony, (2) harvest from the colony only once in two years, (3) collect only the first clutch, and (4) collect no more than 20% of the eggs laid in the season (Krasovski 1937, Kaftanovski 1951, Uspenski 1956, Belopolski 1957). Nevertheless, dramatic decline in exploited colonies was observed. Commercial harvest was closed down in 1954 after a nuclear testing ground had been established on the archipelago and local population had been transferred to the mainland.

Seabird colonies along the Murman coast of the Barents Sea were planned to be harvested extensively in the beginning of XX century. After a pilot expedition organized by Poultry Institution to the Kola Peninsula in 1932 a harvest project was proposed which allowed to harvest as many as 50% of the nesting seabird population (Karpovich 1988). Fortunately, these plans have never been materialized.

Another relatively large-scaled harvest of marine birds used to occur on Kolguev Island. The island was discovered by Pomors in XI century, while Nenets people came and settled there in early XIX. It involved hunting for moulting waterfowl in coastal waters of the island. Both local Nenets and seasonal Mezen' Pomor hunters visited Kolguev during summer, harvested geese and seaducks untill early XX century. After geese, the most important target was the king eider which came to the inshore waters south of Kolguev to moult. Sergey Maksimov (1871) was first to describe this: hunters on small vessels encircled eider flocks moulting on coastal shoals, forced them ashore and trapped them with fence-nets. Salted ducks were packed in barrels and later used for local consumption (by Nenets) or transported to the mainland for sale (by Pomors). However, poor quality of this product made it very cheap at sale on the mainland and useful for poor people only. Both Pomors and Nenets also collected eiders' and divers' eggs. Divers were also harvested for their skins by Nenets who used divers' "fur" for clothes (Maksimov 1971, Trevor-Battye 1895).

Russia used to export large amount of eider down for several centuries. The harvest was largely unsustainable with down being collected during egg laying period. Eggs were also taken and eiders often killed. This accounted for the dramatic decline in most harvested eider populations in the White Sea and along the Murman coast. Remote breeding grounds on Novaya Zemlya were also overexploited, but to a lesser extent. Some protection measures for eider colonies were attempted in second half of XIX century, but they were not systematic and did not resulted in a success. The only effective protection was implemented on the grounds belonging to the Solovetsky Monastery in Onega Bay in the White Sea and to the Triphon-Pechenga Monastery on Ainov Isalnds, Western Murman, Barents Sea.

Seabirds and their colonies got real protection with the establishment of specially protected areas (SPAs) network in the region. After a series of scientific zoological expeditions to the Kola Peninsula in late 1920s the first strict nature reserve or zapovednik – Kandalakshsky – aiming at protection of seabirds and common eider first of all, was established in 1932 in the White Sea. Then, in 1938 Seven Island Zapovednik was established on East Murman coast. During 1947–1951 Novaya Zemlya Branch of Seven

Island Zapovednik was organized in Gribovaya and Bezymyannaya Bays. Later Kandalakshsky Zapovednik was enlarged, and now it consists of several clusters including Seven Islands, but the Novaya Zemlya Branch was closed down. The only harvest occurring within its territory is an eider down collection organized by zapovednik personnel, however, its scale is negligible nowadays.

Current hunting regulations prohibit harvesting of eggs of all bird species everywhere in Russia. Shooting of birds at sea is also prohibited in the Murmansk region. Nevertheless, seabird eggs (mostly murre and gulls) are still collected illegally in the Barents Sea region. The total illegal harvest is considered to be some thousands of eggs annually. Common eider poaching also occurs, including killing of flightless moulting ducks in some places.

Chukotka

Seabird harvest tradition used to be and still is more developed among local people in Chukotka than in Western Russian Arctic areas. Coastal Chukchi and Eskimo have the best developed traditions of seabird harvest in Eastern Russian Arctic as compare to other northern indigenous people. The following species used to and partly are still harvested in Chukotka (mostly by Chukchi, but also by local non-aboriginal people to a less extent): Northern fulmar (eggs only), cormorants and their eggs, sea gulls and their eggs (vega gull, glaucous gull, black-legged kittiwake) and alcids. Murres and black guillemots used to be an important spring trophy especially on the Wrangel Island where they arrive much earlier than other seabirds in the spring. Birds were used as a food both for men and dogs (Portenko 1972).

However, the most harvested seabirds are eiders, all four species. They used to be harvested both during migration and while moulting. Nowadays, only shooting, primarily during spring migration, is in practice.

Chukchi developed specialized missile tool to catch flying eiders – eplickatet. It consists from 4–7 thick braids 1 m long originally made from reindeer tendons. Braids are tied together at one end while free ends are weighted with small knuckles grinded out from walrus task. The eplickatet being flung to the low-flying eider flock, wraps a bird and forces it to fall down. This method was used during migration and was most effective during foggy weather. Skilled hunters were very effective in catching eiders with eplickatet and could take up to 4–6 birds at once. This noiseless hunting method had great advantage compared to shooting since keeping silence was very important in the proximity of another important game ground, the walrus rookeries. The eplickatet was sometimes also used to catch murres in the colonies or glaucous gulls. Eider catching with eplickatet maintained for a long time along the northern Chukotka coast where eider migration is most pronounced. In some places on southern Chukotka coast eiders were hunted in winter time. The traditional catching method was still common in second half of XX century. Harvest of flightless eiders on their inshore moulting grounds was practiced in late July in Chukotka and also at Kolguev Island. Eiders were entrapped by baidaras (local oared light vessels) and killed by sticks. Harvested moulting eiders used to be an important food sources for local people (Portenko 1972). Besides meat, aboriginal people utilized eider skins with the most valuable part being king eider and spectacled eider heads, which were used for decoration of women clothes and other handicraft.

Eiders are still hunted in East Russian Arctic, both legally and illegally. The data on hunting bags for 16 selected settlements (mostly inhabited by indigenous people) were obtained recently during an advanced survey (Syroechkovsky & Klokov 2007a,b). Here we present summary of this study concerning seabirds, including eiders and other typical seabirds.

Anonymous survey in dozen of settlements revealed the following harvested species: cormorant, divers, kittiwake, vega gull, murres, horned puffin, tufted puffin, and creasted auklet. Typical seabirds (alcids, primarily creasted auklet, and gulls) make a considerable portion of the hunting bag in Sireniki only, SE Chukotka. Here mainly Eskimo live, which traditionally are known to harvest these species in contrast to Chukchi. Seabirds comprised over 70% of total hunting bag, and annual harvest of the entire settlement amounts over 2000 seabirds as extrapolated by the authors (data on a single surveyed year). Another settlement where seabird harvest is also pronounced is Novoe Chaplino, SE Chukotka, where only 17% of the hunting bag falls on

seabirds (annual consumption extrapolated at ca. 370 birds). Here juvenile cormorants and puffins are also harvested, but they were not included in the general statistics. Maximum share of seabirds in the hunting bag of hunters inhabiting arctic coast of Chukotka did not exceed 6–7 % (two settlements) and in some places neither alcids nor gulls were killed.

Divers were killed in a negligible numbers all over the surveyed area, but taken mostly occasionally. Eiders were taken in all surveyed areas, and comprise from ca. 8 % to 70 %. The most extensive eider hunting is found in two settlements in Indigirka Delta following by four settlements in E & SE Chukotka. Individual eider hunting bag ranges within 0.09–13 birds for most places, being 24–32 in "active" settlements, and peaks with 84 eiders per hunter in Indigirka Delta. Extrapolated annual harvest per settlement varies from 30 to almost 3,000 eiders: in one settlement in E Chukotka and in Indigirka Delta 2200–2800 eiders are killed annually; and in four settlements of E and SE Chukotka 1000–1600 eiders are killed. Importance of eiders as a hunting object shows no general geographical trend and depends on localization of a settlement in relation to eiders' flyway since an overwhelming majority of these ducks are killed on spring migration. Mostly eider drakes are killed (60–70%). Species composition of eiders in the hunting bags reflects local availability of certain species and is slightly selective. The majority (90%) of common eiders are shot along the coast of Chukotka Peninsula while king eider harvest is relatively evenly distributed all along the surveyed area. Steller's and spectacled eider harvests are concentrated in lower reaches of Indigirka River, where these two species comprise more than 50% of the entire bird hunting bag since 1990s (Syroechkovsky & Klokov 2007b).

Egging is also practiced in the studied area and involves eiders, alcids, fulmar and sea gulls, eggs of divers and terns are taken occasionally. The only place where egging is relatively important is SE Chukotka with five settlements inhabited by Eskimo. Annual harvest is estimated at 2000 – 4800 seabird eggs dominated by murres, vega gull and fulmar depending on nesting species. Besides, in one settlement on the arctic coast located nearby large seabird cliffs on Kolyuchin Island, people collect gull eggs on a regular basis. Eider eggs are collected in much less numbers, at a scale of few hundreds per settlement at the most. However, the obtained data are not sufficient to make grounded extrapolations and conclusions about egging.

Commander Islands

When Russian expeditions landed on the Commander Islands in the XVII century, they began using the seabird resources intensively. For example, Pallas's cormorant was abundant on the Commander Islands before 1741 when Commander Vitus Bering was shipwrecked on what was later named the Bering Island. The crew of Bering's ship used this species as a main food item because it was much bigger and tastier than other birds. This exploitation, combined with disease outbreak, probably contributed to the extinction of Pallas's cormorant (Iohanzen 1934).

In the 19th century, the Commander Islands were settled by Russians and Aleuts who also harvested seabirds and collected eggs. Their preferred species were northern fulmars, pelagic cormorants, thick-billed murre, horned and tufted puffins, and glaucous-winged gulls. The total number of birds and their eggs harvested annually were estimated as tens of thousands (Iohanzen 1934). Sometimes all the eggs in the colonies of Ari Rock near Bering Island and Sivuchi Rock near Medny Island were collected during the breeding season (Marakov 1966).

In 1990s, Aleuts on Toporkov Island (in the Commander Islands) collect 2,500–3,000 eggs annually (Zelenskaya 1999). This is considered to be a traditional use for the Aleuts in the area.

In 1993, Komandorsky Zapovednik was established in the Commander Islands archipelago. One of the special purposes of the reserve was to protect seabird colonies against exploitation. Nowadays, some illegal seabird egging still occurs due to a lack of law enforcement.

Kamchatka Peninsula

Historically, local people collected the eggs of common gulls and black-headed gulls in large colonies near Petropavlovsk and Ust'Bolsheretsk. The total number of eggs collected annually amounted ca. 4,000–5,000 (Gerasimov, pers. comm.). Today, seabirds in this area are not harvested or at least considered negligible.

4. Management recommendations

Briefly, Russian recommendations to improve the management of seabird harvests are as follows:

- Sort out different pieces of legislature concerning nature conservation, hunting and rights of Indigenous Minorities of the North, and to work out regional legislative acts on hunting and harvest in all northern constituent entities of the Federation.
- Develop and improve national monitoring of hunting bags including subsistent and traditional harvest of the Indigenous Minorities of the North, Siberia and Far East.
- Following CAFF Conservation Strategies on seabird species, work out national management plans on murres, eiders and ivory gull. To improve regional nature conservation activities to implement seabird management plans, conservation laws, and hunting regulations.
- Cooperate and coordinate with non-governmental organizations to improve education and outreach programs for conserving seabird populations in Russia. Ensure education and outreach to be combined with law enforcement.

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Conclusions and recommendations

All the arctic nations have a long-tradition of harvesting seabirds. However, the number of birds involved, or believed to be involved, vary enormously between the nations. In North-Norway and Svalbard the estimated take sum up to approximately 5,000 birds per year, while Iceland harvest on average 350,000 seabirds per year.

Previously, seabirds were harvested mainly for basic subsistence, but now there is a tendency in most countries that they are increasingly undertaken for cultural or sporting reasons. There is also a tendency in several countries that harvest levels are declining due to factors such as fewer active hunters, poor reproduction in seabird colonies, more restrictive hunting regulations, or a combination of these factors. Still, in Alaska, Canada, Greenland and Russia it is common practice that more extensive harvest rights apply to indigenous minorities or certain northern communities in general, acknowledging that subsistence harvest is essential for them to maintain a traditional life style.

The species most harvested vary from country to country and depend mainly on traditions and accessibility to the seabirds. However, in a circumpolar perspective murres and eiders constitute by far the most numerous birds in the harvest, largely as a consequence of a widespread distribution. Certain species are of major importance for one or two countries, but not for the remaining countries, such as puffins in Iceland and the Faroes, fulmars in the Faroes and dovekies in Greenland.

K. Falk: *Installing photo monitoring equipment in a murre colony (Kippaku),* West Greenland.

Table 1: Summary of the national recommendations from this report (2008) and the recommendations from the previous CAFF harvest report (2001). Action items that were addressed in the intervening period are denoted as 1+

Recommendations	Alaska		Canada		Faroes	Finland		Greenland		Iceland		Norway		Russia		Sum		
	2001	2008	2001	2008	2008	2001	2008	2001	2008	2001	2008	2001	2008	2001	2008	2001	1+	2008
Research and monitoring																		
Monitor seabird colonies	1+	1	1+	1					1	1+	1	1+	1			4	3	5
Monitor seabird wintering areas			1+	1												1	1	1
Improve colony databases	1+															1	1	
Study/reduce human disturbance at colonies	1									1	1					2		1
Study effects of climate change on seabirds		1									1							2
Study recruitment of game species						1+	1									1	1	1
Harvest information and management																		
Develop/improve/validate harvest surveys/data	1+	1	1+	1	1				1	1+	1	1	1		1	4	3	7
Evaluate effect/sustainability of harvest			1+	1	1	1	1		1	1+	1	1+	1			3	3	6
Quantify "bycatch" of seabirds				1					1									2
Reduce harvest in certain regions	1+							1+		1+	1				1	3	3	2
Develop/improve harvest license system	1		1+		1					1+						3	2	1
Change harvest regulations						1+		1+						1+	1	3	3	1
Designate more protected areas									1									1
Develop/improve management plans														1+	1	1	1	1
Determine economic value of harvest	1	1														1		1
Determine cultural value of harvest	1	1														1		1
Collect TEK on seabirds and harvest	1+	1						1+								2	2	1
Communication and education																		
Improve national cooperation	1+	1		1				1+		1				1+	1	4	3	3
Improve international cooperation	1+	1					1		1		1	1+				2	2	4
Improve outreach and education	1+	1	1+	1				1+		1+				1+	1	5	5	3
																41	80%	44

B. Olsen: *Puffins harvested in the Faroes using the "fleygastong".*

Commercial harvest is forbidden in most countries. However, in Greenland and Iceland it is legal to supplement other sources of income by some domestic or local sale of seabird harvest. Illegal trade and sale of seabirds appears to be a problem in Canada and perhaps also in other countries. Export of seabirds or their products are generally forbidden within the arctic nations. The most notable exception is the export of eider down from the "eider-farming" industry, mainly in Iceland.

National recommendations

This section includes a summary of the national recommendations published in the 2001 harvest report, the recommendations that were addressed between then and now, and the new national recommendations presented in this report (Table 1). The details about the nature of these recommendations and how they were addressed are outlined under each country chapter in this report. The reader should be aware that the recommendations in the 2001 report were drafted in 1999 or 2000 (not 2001), and the new recommendations in 2007 or 2008.

The number of actions recommended by each country in the 2001 report varied quite a bit, but is hardly comparable since also the content of individual actions varied a lot. In Table 1 individual national recommendations are grouped into broader themes and action items. Some countries recommended multiple actions over the same theme. In Table 1 such actions are recorded only once. On the other hand, recommended actions addressing multiple action items are recorded under each of them.

Acknowledging the long-tradition of seabird harvest in the arctic and the importance of subsistence harvest in some regions, the CBird group under CAFF has put much effort into producing circumpolar conservation strategies and action plans for targeted species and in this process dealt with a number of inherited harvest issues. This is well reflected in the summary table. As many as 80% (countries combined) of the actions recommended in the 2001 harvest report were addressed in the period between 1999 and 2007.

Especially three action items were recommended repeatedly by the circumpolar nations. Under the theme "research and monitoring" it was highly recommended to monitor seabird colonies at various levels and concerning "harvest information and management" it was emphasized to develop or improve national harvest survey methods, to validate the data from these surveys, and to evaluate population effects (including sustainability) of known harvest levels (Table 1). Despite the fact that these issues received much attention in the period between this harvest report and the previous one, these three action items are rated even higher for the coming period (Table 1, 2008 recommendations). This reflects that monitoring programs ideally represent ongoing work and that the implementation of suitable harvest surveys and the validation of such are highly time-consuming processes. Often the accuracy of harvest estimates require species-specific validation steps, since one survey method rarely generates comparable estimates for all species involved. Nevertheless, both harvest statistics and population estimates are needed to ensure that harvest does not exceed sustainable levels. It is clear from the country reports that the intensity by which harvest levels are surveyed and the methods used differs from country to country, and there may be unexplored possibilities to harmonize or adapt feasible surveys between countries.

In the 2001 harvest report several countries recommended to reduce harvest levels for certain species and regions (Table 1). In Finland and Greenland this was accomplished by major changes in the harvest regulation; in Finland the long-tradition

of harvesting drakes in the spring was banned, and in Greenland the harvest of several key species was reduced to at least half of previous levels by closing the hunting season during late winter and spring. For the coming period only Russia recommends new adjustments to the harvest regulation.

Focus on communication and education was recommended both in the previous harvest report and in this one (Table 1). The cooperation between Canada and Greenland in harvest management of northern common eiders, or the ivory gull monitoring and research cooperation between Norway, Russia, Canada and Greenland are good examples of successful international cooperation on shared seabird populations. However, it is also clear from the country reports that national cooperation between state, federal and native representatives are essential to establish effective management bodies. In 2000 Alaska succeeded in establishing the Alaska Migratory Bird Co-Management Council, which will deliver recommendations for migratory bird subsistence harvest regulation. In all aspects of national and international cooperation outreach and education should be a component of the management strategy.

General recommendations

Based on country reports and the above summary table (Table 1) the CBird group recommends the following actions for the circumpolar region:

- Increase efforts to define and assess the impact of harvest pressures on shared seabird populations, in particular threatened or declining species, and implement collaborative harvest management strategies/plans for such shared populations. To the extent possible, include ecosystem- and climate change variables in the assessment.
- Identify declining species and populations, for which harvest is a known or suspected vector, and call for joint research projects between all or several arctic countries (e.g., as done for common eider and ivory gull).
- Continue to implement or improve seabird harvest surveys on a national level. On a circumpolar level, the CBird group should exchange experience about survey methods and work towards optimizing and harmonizing methods. The CBird group should also aim at developing appropriate tools to validate harvest statistics.
- Increase efforts to implement circumpolar or regional long-term monitoring programs for selected species. Use the framework documents “Circumpolar Seabird Monitoring Framework” and “Circumpolar Seabird Monitoring Plan” (now being published) as the foundation and draw upon experiences from advanced seabird monitoring programs such as the Norwegian SEAPOP program and the Finnish Archipelago Bird Census scheme.
- Through cooperative outreach programs disseminate information on distribution, biology and sustainable use principles for shared seabird populations.

APPENDIX A: Scientific names for bird species mentioned in this report (alphabetical order of common English names)

COMMON NAME	SCIENTIFIC NAME
Aleutian tern	*Sterna aleutica*
American white pelican	*Pelecanus erythrorhynchos*
Ancient murrelet	*Synthliboramphus antiquus*
Arctic loon	*Gavia arctica*
Arctic tern	*Sterna paradisaea*
Atlantic puffin	*Fratercula arctica*
Barnacle goose	*Branta leucopsis*
Black guillemot	*Cepphus grylle*
Black scoter (common scoter)	*Melanitta nigra*
Black tern	*Chlidonias niger*
Black-footed albatross	*Phoebastria nigripes*
Black-headed gull	*Larus ridibundus*
Black-legged kittiwake	*Rissa tridactyla*
Black-tailed gull	*Larus crassirostris*
Bonaparte's gull	*Larus philadelphia*
Brandt's cormorant	*Phalacrocorax penicillatus*
Buller's shearwater	*Puffinus bulleri*
California gull	*Larus californicus*
Caspian tern	*Sterna caspia*
Cassin's auklet	*Ptychoramphus aleuticus*
Common eider	*Somateria mollissima*
Common loon (great northern diver)	*Gavia immer*
Common merganser (goosander)	*Mergus merganser*
Common murre (common guillemot)	*Uria aalge*
Common tern	*Sterna hirundo*
Crested auklet	*Aethia cristatella*
Double-crested cormorant	*Phalacrocorax auritus*
Dovekie (little auk)	*Alle alle*
Flesh-footed shearwater	*Puffinus carneipes*
Fork-tailed storm-petrel	*Oceanodroma furcata*
Franklin's gull	*Larus pipixcan*
Glaucous gull	*Larus hyperboreus*
Glaucous-winged gull	*Larus glaucescens*
Great auk	*Pinguinus impennis*
Great Black-backed gull	*Larus marinus*
Great cormorant	*Phalacrocorax carbo*
Great skua	*Catharacta skua*
Greater shearwater	*Puffinus gravis*
Greater white-fronted goose	*Anser albifrons*
Heermann's gull	*Larus heermanni*
Herring gull	*Larus argentatus*
Horned puffin	*Fratercula corniculata*
Iceland gull	*Larus glaucoides*
Ivory gull	*Pagophila eburnea*
King eider	*Somateria spectabilis*
Kittlitz's murrelet	*Brachyramphus brevirostris*
Laysan albatross	*Phoebastria immutabilis*
Least auklet	*Aethia pusilla*
Leach's storm-petrel	*Oceanodroma leucorhoa*
Lesser black-backed gull	*Larus fuscus*
Little shearwater	*Puffinus assimilis*
Long-billed murrelet	*Brachyramphus perdix*
Long-tailed jaeger (long-tailed skua)	*Stercorarius longicaudus*

Magnificent frigate	*Fregata magnificens*
Mallard	*Anas platyrhyncos*
Manx shearwater	*Puffinus puffinus*
Marbled murrelet	*Brachyramphus marmoratus*
Mew gull (common gull)	*Larus canus*
Mottled petrel	*Pterodroma inexpectata*
Northern fulmar	*Fulmarus glacialis*
Northern gannet	*Morus bassanus*
Oldsquaw (long-tailed duck)	*Clangula hyemalis*
Pacific loon	*Gavia pacifica*
Pallas's cormorant	*Phalacrocorax perspicillatus*
Parakeet auklet	*Aethia psittacula*
Parasitic jaeger (Arctic skua)	*Stercorarius parasiticus*
Pelagic cormorant	*Phalacrocorax pelagicus*
Pigeon guillemot	*Cepphus columba*
Pink-footed goose	*Anser brachyrhynchus*
Pink-footed shearwater	*Puffinus creatopus*
Pomarine jaeger (Pomarine skua)	*Stercorarius pomarinus*
Razorbill	*Alca torda*
Red phalarope	*Phalaropus fulicaria*
Red-breasted merganser	*Mergus serrator*
Red-faced cormorant	*Phalacrocorax urile*
Red-legged kittiwake	*Rissa brevirostris*
Red-necked phalarope	*Phalaropus lobatus*
Red-throated loon (red-throated diver)	*Gavia stellata*
Rhinoceros auklet	*Cerorhinca monocerata*
Ring-billed gull	*Larus delawarensis*
Ross's gull	*Rhodostethia rosea*
Sabine's gull	*Xema sabini*
Shag	*Phalacrocorax aristotelis*
Short-tailed albatross	*Phoebastria albatrus*
Short-tailed shearwater	*Puffinus tenuirostris*
Slaty-backed gull	*Larus schistisagus*
Sooty shearwater	*Puffinus griseus*
Sooty tern	*Sterna fuscata*
South polar skua	*Catharacta maccormicki*
Storm petrel	*Hydrobates pelagicus*
Thayer's gull	*Larus thayeri*
Thick-billed murre (Brünnich's guillemot)	*Uria lomvia*
Tufted puffin	*Fratercula cirrhata*
Vega gull	*Larus* heuglini *vegae*
Western gull	*Larus occidentalis*
Whiskered auklet	*Aethia pygmaea*
White-winged scoter (velvet scoter)	*Melanitta fusca*
White-winged tern	*Chlidonias leucopterus*
Yellow-billed loon (yellow-billed diver)	*Gavia adamsii*